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UMTA Small Transit Vehicle Procurement Workshop Proceedings

U.S. Department of Transportation
Urban Mass Transportation Administration

Prepared by:
Transportation Systems Center

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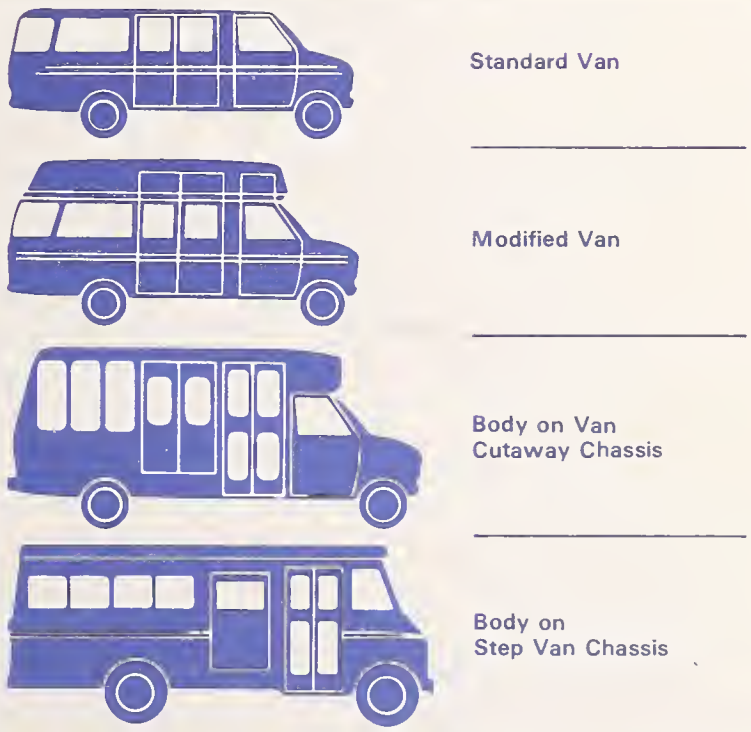

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16. Abstract

The workshop on procurement methods for small transit vehicles, held in Indianapolis Indiana, on November 15 and 16 was organized to provide the owners, manufacturers and operators of small transit vehicles with a forum to discuss problems and progress in the procurement arena. Among the topics highlighted were the efficiency of various procurement methods, how to prepare adequate specifications, whether manufacturers could meet industry requirements, and UMTA's work in guiding these processes. This document summarizes the important issues raised in each presentation and question and answer period as well as summarizing panel discussions. Examples of state prepared specifications as well as questions and answers on Disadvantaged Business Enterprise (DBE) requirements are presented in the appendices. A list of participants is also included.

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UMTA SMALL TRANSIT VEHICLES PROCUREMENT WORKSHOP PROCEEDINGS

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EXECUTIVE SUMMARY

The UMTA Small Transit Vehicle Procurement Workshop was held in Indianapolis, Indiana on November 15 and 16, 1983. This report summarizes the general session presentation and panel discussions on issues relating to the technical procurement of small transit vehicles. The purpose of the workshop was to provide a forum for state agencies, transport operators and manufacturers to exchange information on procurement practices in the area of small transit vehicles. The workshop also provided agencies with a current awareness of policies, studies, and available technical assistance as well as clarifying the roles of the agencies involved in these activities.

This conference report shows the diversity of people, opinions, and problems which revolve about the purchase of small vehicles. Although no two procurement approaches are exactly alike, the experiences of participants from various parts of the country have a number of common underlying themes. Before attempting to describe any consensus or conclusions, however, it would be best to present the environmental and institutional factors which have affected their approaches.

The operators of small vehicles are providing a new and innovative mode of transportation. Service methods include door-to-door, fixed route, subscription, and demand-responsive operations. The diverse organizations using these vehicles include rural and small city transit operators, a wide variety of non-profit health and human service agencies, private operators, and a substantial number of large city transit districts. Passengers include the able-bodied, but more importantly, this new mode is the principal means of public transportation for the handicapped and elderly. This places unusual requirements for flexibility and ingenuity on both the people and the vehicles involved. They are very much in the public eye and are subject to demands from local governments as well as organized constituents.

Collectively, paratransit operators are too new at this business to be well organized. The manufacturers also lack an "industry association" which focuses on the specific vehicles used in this mode. As a result only a few informal networks exist, and those networks are largely saturated with exchanges on vital funding, organizational, management, and political issues. So far, little attention has been paid to the exchange of technical information on the vehicles themselves. With the pressure to become operational quickly, operators often have had to use vehicles that are not really satisfactory for the job. Manufacturers have a difficult time deciding what to offer, because the users don't have enough experience to know how to specify what they need.

Into this arena, UMTA and State Departments of Transportation (DOTs) have introduced support in the form of funding and technical assistance for the purchase of small vehicles. This workshop was the second in a series sponsored by UMTA to encourage interchange of experience and identify cost-effective means for providing technical assistance.

It should be noted that these workshops were organized to assist public and non-profit agencies which are eligible for Federal capital assistance. The contents, therefore, have included considerable attention to the problem of complying with Federal, state and local government procurement regulations. As the workshop in Indianapolis progressed, a few fundamental observations about small vehicle procurement became evident. These are described in the following paragraphs.

Good Knowledge Of The Small Vehicle Market Is Needed To Conduct A Successful Procurement. In order to meet requirements of funding agencies, buyers must conduct a non-exclusionary, competitive procurement. To do this, the buyer needs to structure a bidding process which will eliminate poor quality and performance, but still include as many sources as possible. It is important, therefore, for buyers to know in detail the characteristics of all vehicles on the market.

Explicit Specifications Are Essential. The size of the small vehicle market precludes dealers keeping stocks of vehicles in showrooms ready for delivery. In this sense, every vehicle is made-to-order and the user will likely receive a product which has not been tested extensively in use by other customers. In addition, almost all vehicles used in rural and paratransit operations have at least a few requirements peculiar to the region or method of service. Manufacturers, knowing that the award must be based on the lowest responsive bid, cannot afford to offer durability or maintainability features which are not specifically required. The unanimous conclusion of users, buyers, and manufacturers is that everyone is better off when buyers specify exactly what they want.

Initial Technical Decisions Are Usually The Most Important. During the workshop it became clear that the first steps in structuring a procurement often have the most effect on eventual vehicle durability and life cycle costs. That is, the grouping of available vehicles into comparable categories for definition by the procurement specifications is a critical decision. If the user can afford the capital investment in a heavy duty vehicle (7 to 10 year life), the procurement specification will automatically exclude lighter models. Further life cycle cost considerations during the procurement process are not likely to be significant enough to override the low bid. The most important decisions appear, therefore, to be made before the procurement goes to bid. A vehicle "catalog" and a set of guideline specifications covering each of the categories of vehicles used in the region are recognized as highly useful tools for making these decisions.

Market Characteristics Call For Sophisticated Procurement Practices. Most experienced buyers recommend a two-stage procedure which includes a bidders conference or other means to resolve technical questions with manufacturers. In addition, Federal and State regulations governing expenditures of public funds have become increasingly complex - including extensive pass-through terms and conditions. The "Buy America" and "Disadvantaged Business Enterprise" requirements are both examples of recent changes which must be understood and implemented by buyers. In addition, recent experiences of procurement managers who participated in this workshop have led them to recommend performance bonds, well-defined warranty clauses, and special provisions on how warranty service is to be provided. These inputs indicate clearly that the procurement process needs the kind of careful planning, scheduling, documentation, monitoring and controls that can best be provided by a professional procurement office.

Technical Expertise Is Required Throughout The Procurement Process. The chassis and vital components of almost all small transit vehicles on the market today are derived from other segments of the automotive industry. These components take advantage of the higher volume production of vans, delivery vehicles (step-vans), trucks and schoolbuses. Without an understanding of the inherent limitations of these components, it is quite possible to specify a vehicle which cannot be built, would be prohibitively expensive, or could be challenged as exclusionary. Another point brought

out by buyers during the workshop was the value they have derived from detailed in-process and acceptance inspections. The need for this was confirmed by vehicle users. However, all parties attest to the difficulty of making a qualified mechanic available at the right time.

In total, the experience of workshop participants leads to the conclusion that technical expertise is vital, not only for writing specifications, but for structuring initial choices and overseeing acceptance.

State Governments Appear To Be A Logical Source For First-Hand Technical Assistance. Although States vary in the degree of control exercised over small vehicle procurements and the level of technical staff which can be assigned, they represent the nearest resource for problem-solving help to small operators. The State role in funding assistance reinforces that inclination. Another important contribution is being made by States in the area of procurement methods -either by defining procedures for use by operators, or by actually conducting the procurements. The rationale for State involvement is based largely on avoiding duplication of effort on specialized tasks which are common to most operating agencies. In addition to specifications and procurement procedures, States can make valuable contributions in:

- o Education - The number and variety of people who must be informed about small vehicles is substantial.
- o Front-end Planning - Help in determining market availability, vehicle capabilities, and selection criteria and in structuring procurements is especially useful to new agencies.
- o Inspection and Trouble-shooting - Expert specialized resources are difficult for small agencies to retain for occasional jobs such as these.
- o Data Collection and Analysis - Actual performance and maintenance cost data are vital to selecting appropriate vehicles.

At Present, UMTA Technical Assistance Should Concentrate On Information Exchange. Several examples from State technical assistance programs indicate that to meet the varied needs of operators, locally organized vehicle fairs, mechanics training programs, specification reviews etc., are more practical than national conferences. However, this workshop demonstrated substantial benefits from an interchange among States, large urban agencies, manufacturers, and a cadre of experienced rural and special service operators. Since the state-of-the-art in specifications and procurement practices is still in a formative stage, periodic updating interchanges on these subjects appear to be warranted. Development of a common vocabulary for small vehicles and standardized call-outs for Federally required (e.g. Motor Vehicle Safety Standards) specification paragraphs would be helpful. In addition, several other areas relating to vehicles could also benefit from workshops or other forms of information exchange. These include such subjects as vehicle maintenance, safety training, insurance, vehicle rehabilitation, and fleet management. While the workshop is an effective medium, UMTA also should not overlook the importance or value of document dissemination. Manuals, reprints of recent specifications, guidelines, training materials, procedures, and evaluation studies are of considerable value. Finally, the overall field is weak in hard facts. Buyers and users of small vehicles are badly in need of data to make and support decisions.

It is interesting to note that none of the participants proposed a Federal Specification or a Federal Bus. In fact participants were reluctant to recommend UMTA sponsorship of hardware research and development in general - probably because the national

market for specific improvements is difficult to forecast. The one exception is a universal desire for a more appropriate set of chassis which could be used by body manufacturers as baselines for the variety of vehicles needed. However, the problem appears to be more in the size of the market (manufacturing volume) than in the engineering necessary to obtain appropriate brakes, suspension systems, and drivetrains. Support for development, therefore, would not guarantee that the industry will invest in the manufacturing of such articles and that their costs would be competitive. A modest effort to obtain the best judgement of chassis and body manufacturers on this issue would be helpful.

In summary, the new form of transportation created by organizations which provide rural and paratransit services is strongly affected by the availability of suitable vehicles. While optimum vehicles for the many sizes and duty cycles needed by these organizations are not likely ever to be produced, vehicles that can do a reasonable job are available. The task for operators and State DOTs is to find the best vehicle at lowest lifetime cost for each of the applications. UMTA can help conserve Federal and local investment in these vehicles by accelerating the flow of information necessary to make better choices and get the most out of the vehicles selected.

INTRODUCTION

The UMTA Small Transit Vehicle Procurement Workshop concentrated on technical procurement aspects of vans, converted vans, and the smallest capacity buses which are currently being used for urban and rural public transportation. Many of these vehicles are purchased with capital assistance provided to State Departments of Transportation through Section 16(b)(2) and Section 18 of the Urban Mass Transportation Act. A larger number of similar vehicles are purchased independently by private operators and social service agencies. A growing number are also being used by urban agencies for special service for elderly and handicapped riders.

Specific objectives of the Workshop were to:

- Enable State agencies, transportation operators, and manufacturers to exchange recent experience with guidelines, specifications, procurement procedures, and technical assistance for small vehicles
- Provide agencies with current reports on the status of policies, studies, and technical assistance information and resources
- Clarify roles and strengthen intergovernmental networks for communication and technical assistance.

The workshop format included an overview of work in progress in the field of small vehicles and a number of smaller meetings for detailed reviews of procedures and specifications. Panel meetings included representatives of UMTA and the manufacturing industry as well as experienced operators and State coordinators. Representatives from Illinois, Iowa, Michigan, North Carolina, Ohio, and Pennsylvania provided valuable workshop leadership.

The workshop was conducted in Indianapolis, Indiana on November 15 and 16, 1983. It was sponsored by UMTA's Office of Technical Assitance, Office of Bus and Paratransit Systems, and was chaired by Raymon Lopez, chief of the Vehicle and Facilities Systems Division of the UMTA Office of Technical Assistance. The American Association of State Highway and Transportation Officials (AASHTO) provided invaluable assistance in selecting agenda topics and organizing participation. The Indiana Department of Transportation hosted the meeting, provided the facilities, and made all local arrangements. The workshop was managed by James Dumke of the Technology Sharing Office at the U.S. Department of Transportation's Transportation Systems Center.

This report summarizes the general session presentations as well as panel discussions.

SECTION 1

OVERVIEW OF UMTA'S TECHNICAL ASSISTANCE PROGRAM

Ramon A. Lopez
Chief, Vehicle Systems Division
UMTA Office of Technical Assistance

OVERVIEW OF UMTA'S TECHNICAL ASSISTANCE PROGRAM

Ramon A. Lopez
UMTA Office of Technical Assistance

The UMTA Technical Assistance Program had its origins in the Office of Research, Development and Demonstrations which initiated a number of large programs in the early 1970s based on the concept that high technology, when applied to the problems of the transit industry would solve those problems in the United States. This original proposition did not recognize that the transit industry, starved for funding since World War II and facing a declining ridership base, lacked the infrastructure necessary to deal effectively with applied high technology.

During the late 1970s UMTA's Bus and Paratransit Systems Office managers came to realize that, in order to make their program more effective, better communication between UMTA and the transit industry had to take place. The Director of the Bus and Paratransit System's Office established and developed a close working relationship with the Bus Technology Liaison Board (BTLB) of the American Public Transit Association. The BTLB serves as a mechanism to provide input to many of the projects, including the annual program of the Bus and Paratransit Systems Office.

Current projects of the Bus and Paratransit Systems Office include several concerned with the improvement of fuel economy and alternative fuels for regular transit buses, as well as a series of projects concerning improvements to bus brakes, transmissions, and air-conditioning equipment. It should be noted that there are no exotic projects on the list. These projects were designed to solve real problems experienced by transit bus operators. However, there is little applicability of this work to small buses.

In the field of small transit vehicles Bus and Paratransit Systems Office activities are presently limited to two general categories of effort. The first of these is the New Bus Equipment Introduction (NBEI) Program. The purpose of the NBEI program is to test various domestic and foreign bus design features in order to assess the extent to which they improve accessibility, fuel efficiency, reliability, and reduced maintenance costs. While the NBEI program selections are primarily in the standard and articulated bus categories, several systems have been selected for projects dealing with small buses. These are the Central Ohio Transit Authority in Columbus, Ohio, the Michigan Department of Transportation, the District of Columbia Department of Transportation, and South Coast Area Transit (SCAT) of Oxnard, California. These smaller bus demonstrations involve the purchase of vehicles with such features as diesel propulsion, accessibility features such as low floors and wide doors, disk brakes, heavy duty suspension and chassis, and computerized field monitors.

The other small transit vehicle program that UMTA is currently sponsoring is the Paratransit Vehicle Program. The paratransit vehicle was designed for ease of access for elderly and handicapped under conditions of standard taxi service. To prove the feasibility of the concept, UMTA put together a performance specification, and had two prototypes tested which were built to meet that specification.

Pittsburg has a grant to buy a number of these vehicles for use by the local taxi services. They have recently opened bids for these vehicles. Dade County, in Florida, is preparing to proceed with their grant to do the same thing. Reports will be developed to document the performance of these vehicles.

There are several reasons for the UMTA Technical Assistance program's slant toward the standard and articulated transit vehicles. Most important is that the standard bus is the workhorse of the transit industry, carrying over 70 percent of transit passengers.

The agenda for this workshop was designed to introduce the UMTA Office of Technical Assistance into the network of people who are using smaller vehicles to supply transit services, and, if there is no such network, to act as a catalyst for its creation. To that end, it was proposed that the workshops be structured as an information exchange that would serve the operators in dealing with technical issues in writing specifications, and procuring and operating small transit vehicles. The second purpose of this meeting is to provide a voice for the operators of small transit buses; and to develop an information exchange mechanism as a means for providing UMTA with inputs necessary to build a program in the small bus field that reflects the needs of the small bus operators, and is responsive to those needs.

SECTION 2

IMPLEMENTATION OF THE SURFACE TRANSPORTATION ACT OF 1982

Edward J. Gill, Jr.,
Special Assistant to the Chief Counsel-UMTA

IMPLEMENTATION OF THE SURFACE TRANSPORTATION ACT OF 1982

Edward J. Gill, Jr.
Special Assistant to the Chief Counsel - UMTA

There are two provisions of the Surface Transportation Act of 1982 which are pertenent to activities at this conference. The first is the so-called "105f" requirements which is the disadvantaged business enterprise requirement. The Department of Transportation has been working for several years to come up with special disadvantaged business and minority business enterprise regulations for transit vehicle manufacturers.

What we have done in issuing the regulations is to distinguish transit vehicle manufacturers from all others, and to allow the transit vehicle manufacturers to set goals. This means that when grantees go out for bids on a transit vehicle, they do not have the responsibility of setting goals, the responsibility falls on the transit vehicle manufacturer. These regulations went into effect on October 1st, 1983.

The basic requirement is that for any transit vehicle manufacturer to bid on an UMTA-funded contract that goes out for bids after October 1st, 1983, that manufacturer has to have submitted a Disadvantaged Business Enterprise (DBE) plan to UMTA. The manufacturer must have submitted the plan to UMTA and must certify that fact to the grantee. The plan does not necessarily have to be approved by UMTA, but it cannot be disapproved by UMTA. We have had a situation where the bidder submitted a bid and the certification on the exact same day. That's acceptable. All the manufacturers have to do is submit a certification that they have submitted their plan to UMTA.

The UMTA Chief Counsel's Office will keep our regional offices informed as to who has obtained certifications, and whose plans have been disapproved. The best contact for a current list of manufacturers who have submitted 105f certifications will be your UMTA Regional Office. UMTA Headquarters will make every effort to work with transit vehicle manufacturers to resolve problems and not disapprove plans outright because that would cause chaos in the bidding area.

The other section of the Surface Transportation Act which affects purchases of small vehicles is the Buy America requirements. The UMTA regulations which implement the act were published this September and are now available. One of the major impacts of the revised Buy America requirements is a statutory change that applies the Buy America requirements to all contracts between a grantee and a vendor. The old requirements only applied to contracts over $500,000. There is a difference within the statute itself, and it is clear on its face that the requirement applies to all contracts.

This has a major impact on the procurement of small vehicles. In the past most buyers didn't have to worry about the regulations because purchases were under $500,000. Now they do have to be concerned with them. The requirements for transit vehicles are the same, basically, as they were under the 1978 Buy America requirements, and that is that 50 percent of the components of the vehicle, by cost, have to be of US origin, and final assembly of the vehicle has to take place in the United States. One thing that should be pointed out in this area is that UMTA has granted a waiver for spare parts that are purchased at the same time as the original vehicle and for up to 10 percent of the contract cost.

NOTE: Subsequent to this workshop, the Secretary of Transportation granted a waiver to the final assembly requirements, only for 15-passenger vans assembled in Canada.

SELECTED QUESTIONS AND ANSWERS ON THIS SESSION:

Question: On DBEs, can buyers satisfity their goals by having manufacturers meet the requirements?

Answer: Two goals have to be established. Each recipient of UMTA funds has to set up goals for contract opportunities excluding the purchase of vehicles. A second group of goals for the vehicles are established by the manufacturers themselves.

Question: For our non-vehicle procurements, if we have a DBE set-aside goal, can we remove a procurement from the set-aside if all bids from DBE firms are 10 percent (or some reasonable figure) higher than the normally accepted price?

Answer: At any time under the provisions of OMB Circular A-102, a grantor can eliminate bids for "good business reasons."

Question: Can we limit purchases to suppliers within the state?

Answer: The Buy America Act allows a state to impose a stricter Buy America requirement than the Federal Law. It does not allow a state to impose a "Buy State" law. UMTA has interpreted the Bradimus Ammendment Announcement as prohibiting "Buy State" regulations because such requirements would be exclusionary.

NOTE: Additional questions on DBE requirements are covered in "Questions and Answers" of Section 105f prepared by the UMTA Chief Counsel's Office subsequent to this workshop. The general "Q&As" are included in Appendix C to this document.

SECTION 3

NEW PROGRAM GUIDANCE FOR SECTION 16(b)(2) and SECTION 18 CAPITAL ASSISTANCE

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NEW PROGRAM GUIDANCE FOR SECTION 16(b)(2) AND SECTION 18 CAPITAL ASSISTANCE

Albert Neumann
UMTA Office of Grants Management

Sections 16(b)(2) and 18 of the Urban Mass Transportation Act provide the statutory authority (and nomenclature) for two important programs. The purpose of the Section 16(b)(2) Program is to provide assistance in meeting the needs of elderly and handicapped persons where public transportation services are unavailable, insufficient, or inappropriate. It provides capital assistance to private nonprofit organizations which serve the elderly and handicapped in all areas -urbanized, small urban and rural. The purpose of the Section 18 Program is to assist in the development, improvement, and use of public transportation in rural and small urban areas. Section 18 funding is provided to both public and private nonprofit agencies for operating as well as capital expenditures necessary to provide services to the general public.

Effective October 1, 1983 UMTA has assumed total responsibility for the Section 18 Program which previously had been administered by the Federal Highway Administration. This change provided an opportunity to streamline the application, grant-making, and administrative procedures for both programs. The new program, guidance for Section 18, UMTA circular 9040.1 has just been released and is available from UMTA Regional Offices. The draft of revised program guidance for Section 16(b)(2)* has been completed and is currently being reviewed.

Similarities

While the overall objectives of the Sections 18 and 16(b)(2) Programs differ -- that is, one is to provide transportation to the general public in non-urbanized areas and the other is to serve the elderly and handicapped on both rural and urbanized areas -- there are parallels which make it desirable to administer them in a complementary way. For example, in both programs, funds are allocated to the State by formula and are administered by a State agency. With few exceptions, the two programs are administered by the same State agency. To the maximum extent feasible, the UMTA guidelines for both programs are consistent, to simplify program administration.

Many of the Section 18 local recipients are private non-profit organizations, and in some cases a single agency receives both Section 18 and Section 16(b)(2) funding. In other cases, recipients of Section 16(b)(2) funds seek to participate in coordinated service arrangements which also include Section 18 funded organizations. UMTA encourages the participation in such coordinated efforts as long as both program resources continue to serve their primary clientele.

*UMTA Circular 9070.1 dated February 16, 1984 on Section 16(b)(2) is now also available from UMTA Regional Offices.

State Role in Program Administration

The principal responsibility and authority for administering both programs is with the Governor or his designated State agency. The Governor is responsible for developing program criteria and notifying private nonprofit organizations of the availability of the program.

UMTA intends to eliminate a project by project review and approval at the Federal level, and plans to use the annual program of projects as the primary vehicle for making funds available to the State. Under this process, the State agency is expected to certify eligibility of applicants and project activities, review applications, select projects for approval, ensure compliance with Federal requirements, monitor local projects, and oversee project audit and closeout.

UMTA will obligate funds based on the program of projects included in a statewide grant application. Once the application is approved, funds will be available for State administration and for allocation to individual nonprofit agencies within the State. Before Federal funds can be expended on individual projects, however, the State must certify to UMTA that the local recipient has met all statutory and program requirements and must enter into an agreement with the local recipient.

UMTA Role in Program Administration

The UMTA headquarters office is responsible for: providing overall policy and program guidance for the Section 16(b)(2) and Section 18 Programs. The UMTA Regional Offices have the day-to-day responsibility for administration of the program. Regional Office activities include: reviewing and approving State grant applications; obligating funds; working with States to implement the annual program; receiving State certifications and amendments to the program of projects; and overall program management.

Funding

For Section 16(b)(2), the funding level for each State is announced for each Federal Fiscal Year in a letter from the UMTA Administrator to the Governor of each State. The allocation of funds to States is by formula based on the percentage of elderly and handicapped population in each State. For FY 84 Congress earmarked $25 million for 16(b)(2) Programs.

For Section 18, the funding level for FY 84, 85 and 86 is equal to 2.93 percent of the amount appropriated under Section 21 of the UMTA Act. Formal notification of the Fiscal Year apportionment to each State is made through publication in the Federal Register subsequent to enactment of DOT appropriations or a continuing resolution. The apportionment is a legislatively mandated formula based on the ratio of non-urbanized population of each State to the non-urbanized population of all States. Figures are based on the 1980 Census. Allocations to States for FY 1984 have been published and total $69,985,751.

Availability of Funds

Section 16(b)(2) funds will be available to the States for obligation for one year following the close of the Fiscal Year in which they were allocated. Section 18

funds apportioned in FY 83 and subsequent years are available for obligation for two years after the Fiscal Year for which they were apportioned instead of three years. This applies also to unobligated funds from prior years.

State Administration Costs

For Section 16(b)(2), Program Administration Costs of up to 10 percent of the State's Fiscal year allocation are allowable and are included as a separate budget line item. UMTA bears 80 percent of the costs, and the State 20 percent. Under Section 18, the State may apply for an amount not to exceed 15 percent of its apportioned funds to administer the program and to provide technical assistance to local recipients. These expenses are funded at 100 percent Federal share.

Federal Matching Requirements

For the Section 16(b)(2) Program the Federal share is not to exceed 80 percent of net program cost, and the local share can be no less than 20 percent of net program cost. Under Section 18, the Federal share of eligible capital expenses is not to exceed 80 percent of net project cost. The Federal share of operating costs cannot exceed 50 percent and the local share of eligible capital and administrative costs must be no less than 20 percent.

SECTION 4

SMALL BUS MANUFACTURING INDUSTRY

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SMALL BUS MANUFACTURING INDUSTRY

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Transportation Systems Center, US DOT

Small transit buses, although less prominent than standard transit buses in public transportation, are essential to many public transportation services and form an important element in the nation's system of public transportation. Small transit buses which are the principal component of many small city and rural systems, are used also in some large-city congested downtown areas and for many varieties of paratransit services. To a much greater extent than is true for standard transit buses, small transit buses are used by public service agencies and by private business to provide transportation services. Examples include transport for the activities of church groups and airport shuttle services.

Despite the many disparate and highly visible uses of small transit buses, the industry which manufactures them has remained obscure. No industry association exists; no reliable statistics concerning their production or use are produced; merely identifying current manufacturers and available vehicles can be a difficult problem. A study sponsored by UMTA has been examining the small bus manufacturing industry with the twin objectives of a systematic understanding of the diversity of vehicle types and manufacturers, and of identifying important economic trends in the industry with implications for public transit.

One important reason found for the extreme diversity of vehicles and manufacturers is that small transit buses are a relatively new phenomenon. Unlike the standard transit bus which dates back to before the First World War, the small transit bus is relatively new. The need for a small transit bus did not begin to be recognized until well after standard transit buses had grown in size to their present dimensions. Then, several small vehicles (or chassis) developed originally for other purposes had to be modified and developed as transit vehicles to meet that need.

The study identified four broad categories of vehicles which have been adapted to transit vehicle applications, and, then, in some cases, further developed. These four derivative vehicles are: 1) school buses; 2) forward control chassis delivery trucks or step vans; 3) motor homes, and 4) vans (including van cutaways). Each was originally developed for another purpose and represented a different set of manufacturers. When adapted for transit use, each brought a new set of companies into the transit bus marketplace. Thus, declines in motor home, recreational vehicle (van) and school bus sales during the 1970s each precipitated the entry of manufacturers from these industries into the transit market. The motivation was simply a desire to find new business to replace what was being lost. The result was a large number of manufacturers offering a diversity of vehicle concepts.

Amidst this diversity of vehicle concepts, there were quite a number which failed or have not proved to be entirely satisfactory. The transit duty cycle, with its high mileage, slow speeds, and many stops and starts, is a difficult one. The available componentry and body construction techniques for small vehicles is not as satisfactory as it is for the larger, standard transit buses. There are both technical and economic limitations on the development and use of more durable body construction techniques and components in smaller transit vehicles. The simple reduction of

size precludes or makes awkward the use of components which achieve durability by means, in part, of greater bulkiness or weight. Moreover, the mass production of light-duty components for vans and trucks intended for different applications reduces their cost considerably below that of more durable components manufactured in smaller quantity. For example, the transmission of a standard transit bus, representing one extreme of size and special design, can cost more than a converted van, representing the other extreme.

Nevertheless, the demand for more durability in transit applications has been sufficient to induce an increasing number of manufacturers to offer purpose-built vehicles. Purpose-built small transit buses represent a fifth category, in addition to the four categories of derivative vehicles. The purpose-built category was originally occupied by 30-foot "New Look" buses, and these were not displaced until the early 1970s. Since then, several purpose-built buses of about 30 feet in length have been introduced and, more recently, 26-foot buses are being introduced. Although considerably more expensive than derivative vehicles, the purpose-built vehicles are claimed to have greater durability. Their manufacturers, designing and building a small vehicle primarily for the transit market, represent the committed and self-conscious core of the emerging small-transit-bus manufacturing industry.

Some winnowing of vehicles and manufacturers has occurred in the small transit bus manufacturing industry, due both to failures to meet the requirements of the transit market and to failures in the "parent" markets (i.e., school buses, motor homes, recreational vehicles, step vans). Conventional school buses and motor home chassis are no longer commonly considered appropriate for transit use. Four broad types of small transit bus have emerged: converted van, van cutaway, forward control (step van) chassis, and purpose-built.

The industry is maturing and there is a trend toward involvement by fewer, larger and more committed manufacturers. Several companies have invested in manufacturing facilities especially to produce buses for transit use. Purpose-built buses are now offered by several manufacturers and in several sizes and service configurations. These are all trends which should aid transit users.

There is likely to be increasing pressure from bus body manufacturers on component and chassis builders for component designs which will be more durable in commercial and transit duty cycles. This may result in experimentation with more foreign-built chassis and components, since there are only three domestic suppliers of van cutaway chassis, and only two suppliers of small forward control chassis. Competition among producers to market an inexpensive vehicle around 26 feet in length on a more durable chassis is likely to result in continued confusion about vehicle types and capabilities in this size range, especially if foreign chassis or components are introduced.

Despite the maturing of the industry into a collection of more stable firms, the size of the transit market relative to other markets for small vehicles is likely to remain small, with the result that the energies of many of the companies competing in the transit market will be focused elsewhere. The annual demand for small buses for transit applications appears to be under 3000, compared to an annual demand for 25,000 school buses, 18,000 recreational van cutaways, and 19,000 motor homes. The subordinate position of transit buses among small vehicles will continue to heavily influence the development of small transit buses. The strategies and resources of firms entering or participating in the transit market will also continue to be influenced, and perhaps determined, by events in the other, larger markets for vehicles of similar size.

SECTION 5

A MANUAL ON SMALL BUS PURCHASING, USE AND MAINTENANCE

Douglas W. Palmer
Arthur D. Little, Inc.

A MANUAL ON SMALL BUS PURCHASING, USE AND MAINTENANCE

Douglas W. Palmer
Arthur D. Little, Inc.

Arthur D. Little, Inc. is currently in the data analysis phase of a much-needed project to provide technical assistance to small vehicle operators. The project is sponsored by UMTA under the National Cooperative Transit Research and Development Program (NCTRP) and is the result of a problem solicitation process whereby the transit industry, coordinated through the American Public Transit Association, and Public Technology Inc., selects high priority near-term problems for resolution. Research and development on the selected projects is contracted for and managed by the Transportation Research Board of the National Academy of Sciences.

The general objective of this project is to develop a workbook/manual for local transit operators and to identify actions that can be taken by transit operators, local governments, states, and UMTA to substantially improve the procurement, appropriate use, and maintenance processes for small transit buses. The manual is intended to assist individuals in the cost-effective procurement, maintenance, and operation of buses in a wide range of local, institutional, service, and operation environments. It will be based on research requiring the collection, tabulation, and analysis of primary information and data. Maintenance and fuel economy data are particularly important to this research, since they are prime variables in estimating life cycle costs.

During the past few months, Arthur D. Little, Inc. has been working with the data base containing total bus maintenance costs for the 189 buses for which complete data has been obtained. The data base contains the maintenance events and costs for about 2.37 million miles of bus operation. Table 1 shows how these maintenance miles are distributed over the five bus types and three duty cycles. The number of buses in each combination is also shown. Although the project attempted to survey buses with a wide range of operating conditions, the distribution seen in Table 1 seems to indicate the way bus types and duty cycles are usually combined. All of the purpose built buses are used in heavy "stop-and-go" service. The body-on-van chassis buses are principally in light and medium service and the heavier body-on-truck chassis buses are used in medium duty service. (The duty cycle distinctions are based on measures of "stops per mile.") Vans, perhaps because of their flexibility, appear in all duty cycles.

As the project has evolved it has become clear that what is needed most for procuring vehicles is a workbook that can be used by both experienced and inexperienced agencies to compare life cycle costs of the options which are open to them. Accordingly the workbook/manual will focus on:

- A compact step-by-step procedure with a flow chart and forms
- Data to bolster the agency's ability to estimate the costs of operating and maintaining vehicles under local conditions.

TABLE 1. TOTAL MAINTENANCE MILEAGE IN DATA BASE BY BUS TYPE AND DUTY CYCLE

DUTY CYCLE	BUS TYPE			
	VANS	BODY-ON -VAN	BODY-ON -TRUCK	PURPOSE-BUILT
Light	11,700 (4)	395,600 (36)	57,000 (6)	0
Medium	73,000 (6)	316,800 (21)	193,400 (19)	0
Heavy	83,500 (8)	20,700 (3)	12,300 (1)	1,203,000 (83)

( ) = Number of buses in data base

To build the data base on operating and maintenance costs, the project team performed a literature search and mailed inquiries to owners and operators of buses, manufacturers of small buses, and some manufacturers of auxiliary equipment. Visits were then made to 27 transit authorities to gather on-site cost data. The authorities were so selected as to obtain a variety of climates and bus types. At each site, maintenance personnel were interviewed and specifications were examined to characterize the vehicles in use. Maintenance work orders and fuel records were then obtained for periods of six months or more. The project approach was to produce a consistent "snapshot" of all vehicles for a six-month period.

Although the data is still being analyzed, preliminary calculations indicate that brakes and suspension are the highest source of maintenance costs followed by the engine and driveline. This is not surprising, since all but the purpose-built vehicles are adapted from vehicles which were not originally designed for heavy stop-and-go service. When the confidence limits and final figures are available, it is hoped that the data base will be useful not only for procurement, but also for maintenance planning and for selecting components which would have a payoff from future design improvements.

One interesting by-product of this study was the finding that sufficient hard facts already exist at operating agencies, and that it is not difficult or expensive to collect and convert the data to a consistent base. To that end, an "electronic bulletin board" might provide an inexpensive means for continuing and updating the data base. Such a mechanism could also be used by operators as well as State DOTs as a convenient means for interchanging specification data, procurement experience, maintenance trouble-shooting and other information which would provide mutual technical assistance.

SECTION 6

PROGRESS IN OBTAINING A HEAVY DUTY SMALL VEHICLE

Kamel Boctor
Manager, Transit Hardware & Demonstration Unit
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PROGRESS IN OBTAINING A HEAVY DUTY SMALL VEHICLE

Kamel Boctor
Michigan DOT

The Michigan Department of Transportation has been selected by UMTA to participate in its New Bus Equipment Introduction Program (NBEIP). Objectives of the NBEIP are to:

- Provide for the introduction of improved products into transit service to reduce maintenance costs, and improve fuel economy and accessibility
- Provide the opportunity for transit system operators to form a consensus on which new features in transit vehicles are useful, efficient, and suitable
- Provide manufacturers with the opportunity to assess the marketability and acceptance of features selected for evaluation
- Provide actual cost and operational information based on revenue testing.

Michigan DOT has long contended that there is widespread need for a small heavy-duty bus. It appears that not only in Michigan, but in many other States transit systems are beginning to serve small cities, non-urban areas and suburban areas where standard buses don't make sense because of low passenger load factors and low energy efficiency. In this context, "small" is defined as having a seating capacity of 18-24 passengers.

Typical types of transportation service for small vehicles are:

- Fixed Route for small urban or rural areas where levels of ridership fail to justify the use of a standard bus
- Feeder Service to and from regular transit service or to and from a shopping center or business district
- Downtown Shuttle Service which provides circulation in the urban area or at an activity center
- Demand Responsive service which provides flexible routing and scheduling for shared rides on demand.

Under UMTA's NBEI Program and using a 2 step bid process, Michigan DOT requested technical proposals without prices for 10 Heavy Transit Buses. Responses were received from 12 vendors who submitted a total of 21 proposals. The proposals were evaluated against the specified criteria, and six proposals from five manufacturers were found to be responsive. (Bluebird, Skillcraft, MCR, Chance, and Ontario Bus Industries.)

Price proposals including life cycle costs factors were then requested for the acceptable technical proposals: Cost factors in the life cycle cost evaluation included:

- Fuel Economy
- Air Conditioning Repairs
- Brake System Repairs
- Complete Power Train Repairs
- Suspension System Repairs
- Wheelchair Lift or Ramp Repairs
- Structural Repairs to Body & Frame
- Preventive Maintenance

Five price proposals were ultimately received from four manufacturers. Ontario Bus Industries was the low bidder for both the base price and life cycle cost evaluation method, with its recently-designed Orion II. The bid for 10 vehicles was for about $82,500 each, more than 10 percent lower than the next highest bid.

In addition to meeting the bid specification requirements, the Orion II has a number of innovative features that Michigan DOT is interested in evaluating. It has a very low floor (12 inches from the ground) and includes a kneeling feature that can bring the floor to within 8 inches from the ground. It is thus able to make practical use of a ramp, rather than a wheelchair lift. the vehicle body is a stainless steel welded unit-body construction and uses a new design for windows which can be opened for ventilation or safety. Brakes are a heavy-duty S-Cam configuration with 3/4-inch linings and all accessories are hydraulically driven. The floor layout is a typical transit configuration with the entrance opposit the driver so as to simplify fare collection. Wheelchairs are arranged so as to be forward-facing.

The first deliveries of vehicles are scheduled for May 1984. Michigan DOT is planning to deploy the vehicles to five different cities and will evaluate actual life cycle costs under operating conditions.

SECTION 7

EXPERIENCE WITH LIFE CYCLE COST PROCUREMENT

J.P. Golinvaux, District Manager, Public
Transit Division, Iowa DOT

EXPERIENCE WITH LIFE CYCLE COST PROCUREMENT

J.P. Golinvaux
Iowa DOT

The Iowa Department of Transportation has been working for some time to develop small vehicle procurement procedures which include consideration of life cycle costs. Such a procurement procedure is already in place for buying state-owned vans and trucks. However, for rural and human service passenger transportation, the State DOT decided first to investigate methods used by other States. The objective was to come up with an approach which could be adapted to meet vendor capabilities. Another consideration was that it should avoid changes from year-to-year which would cause vendors to have to expend considerable time and money each time to supply new types of data.

Of the State DOTs surveyed, Florida's approach appeared to be the most practical, so it was used as the basis for Iowa's procedure. The approach makes use of vendor warrantees to enable comparisons of lifetime costs. The basic formula is:

> Contract Award = (bid price) plus (vendor's maintenance cost guarantee) minus (vendor's warranty credit)

The Maintenance Cost Guarantee covers the cost of periodic scheduled maintenance requirements (lubrication, oil filter, etc). Using the manufacturers lubrication and maintenance manuals as authoritative reference, the bidder guarantees that scheduled maintenance costs will not exceed a specified amount (the Maintenance Cost Guarantee) during 12 months or 24,000 miles of operation. A performance surity is required to pay any documented costs in excess of that amount. Maintenance labor cost estimates were not included in these calculations, because of the wide variation in approaches used by operators.

For calculating warranty credits, the useful life for this class of vehicle was based on 120,000 miles total life and an average rate of 24,000 miles per year. The minimum contract warranty requirement was 100 percent parts and labor for 12 months with unrestricted mileage. Extended warranties beyond 12 months were interpreted as an indication of the bidders' faith in the product's reliability. Three major subsystems were included in this method. The chassis included engine and all components below floor line, excluding tires and batteries. The body included all components starting at the floor line, excluding air conditioning. Air conditioning (if ordered) included all lines compressor, and wiring.

If vendors did not meet the minimum requirements, they were assessed a penalty (a dollar amount was added to their bid for source selection purposes.) If they offered warranties beyond the minimum, they were given credits depending on the extended mileage or time. The table shows the figures that were used.

TABLE 1. WARRANTY PENALTY AND CREDITS

UNIT	12 MONTHS LESS THAN 24,000 MI.	12 MONTHS 24,00 MI.	24 MONTHS TO 48,000 MI.	36 MONTHS TO 72,000 MI.	48 MONTHS TO 96,000 MI.	60 MONTHS TO 120,000 MI.
Chassis	+$750	$0	-$750	-$1,400	-$2,000	-$2,500
Body	+$1,000	$0	-$1,000	-$1,900	-$2,600	-$3,200
Air Conditioning	+$500	$0	-$200	-$400	-$600	-$800

Results: On this procurement the bids showed only minor differences in the maintenance cost guarantee figures. However the warranty credit provision did make a difference on vendor selection for one of the vehicles purchased. Generally bidders did not show much interest in including extended warranties on the body and air conditioning, but did include warranty on the chassis. One of the chassis manufacturers offered an extended warranty package that was bought by vendors and included in the bid price.

In summary, it appears to Iowa DOT that the warranty mechanism can be made to work. Without careful evaluation and more experience it is not possible to be sure that the approach actually produces the highest reliability vehicle. It will, however, produce the lowest lifetime cost to the customer. Although life cycle costing is no longer mandatory under Federal guidelines, the Department will continue to use and refine this method as long as interest is shown by vehicle recipients. Iowa will be pleased to send copies of the bid documents to other vehicle purchasers on request.

The single most important lesson learned through this purchasing experience is that any approach to life cycle costing must involve a sit-down session with vendors. The two-phase approach which was used, involved a preliminary bid package to elicit inputs. The final package allowed vendors to ask clarification questions or questions relating to approved equals. Answers to these were furnished to all bidders. It appears that the two-phase approach with bidders' briefing is the best way to avoid protests.

SECTION 8

TRANSPORT CANADA STUDIES ON TRANSIT VEHICLES FOR THE DISABLED

Ling Suen, Senior Special Advisor
Transport Canada, Transportation Development Centre

TRANSPORT CANADA STUDIES ON TRANSIT VEHICLES FOR THE DISABLED

Ling Suen
Transport Canada, Transportation Development Centre

There are several important differences between the Canadian and U.S. approaches toward improving transportation for the physically handicapped. The impetus for the Canadian research program stems from the Highway Traffic Act which allows Provinces to make and enforce regulations governing vehicle standards. Ontario has enacted such a regulation pertaining to transportation of physically disabled passengers. This regulation and a standard drafted by the Canadian Standards Association are likely to have a strong national influence on vehicles and services.

Transport Canada's Transportation Development Centre (TDC) has adopted a mission to extend equitable accessibility for physically disabled persons to the national transportation system. This includes intercity and urban transportation in all modes. To implement that mission, TDC obtains funds from the various Ministries (Air, Marine, etc.) and uses a portion of its own base budget. It maintains a six-point program in technologies applicable to transportation for the disabled:

1. Wheelchairs and Vehicles
2. Level Change
3. Wheelchair Restraints
4. Travel Barriers
5. Technical Aids
6. Database and Information.

TDC does not have a program equivalent to UMTA's Service and Methods Demonstrations.

The project entitled "Transit Vehicle for the Disabled" was undertaken by DeLCan (De Leuw Cather Canada Ltd.) on behalf of the Transportation Development Centre, Transport Canada, and the Canadian Urban Transit Association. The project was undertaken in three separate phases from August 1981 to March 1983. The overall project objective was to improve the access and safety of transportation systems for the handicapped. Rather than develop a prototype, the approach was selected to increase awareness by users, operators, and manufacturers of the needs, characteristics and market for a small vehicle.

The first phase, Definition of Requirements, consisted of an inventory and evaluation of vehicles currently used in Canadian cities. It is apparent that the most commonly used vehicles are modified vans (about 51 percent). The second phase, Market Assessment, estimated the potential market demand for a special purpose, vehicle (on the basis of a survey and on demographic data). Phase III, Specification Guidelines, developed guidelines covering the majority of features specific to a vehicle for transportation of the handicapped, and will be of value both to vehicle developers and vehicle purchasers.

The study concluded that no satisfactory fully-accessible vehicle exists. The market for a $60,000 vehicle (in 1981 dollars) appeared to be only about 200 vehicles a year; about 50 in Canada and 150 in the United States. One important factor affecting the market study was a parallel vehicle development program conducted by Ontario Bus Industries. The development was assisted financially by the Department of Industry's Enterprise Development Program and was coordinated closely with the TDC study project. As a result the prototype vehicle was able to incorporate many of the desirable features identified in the study. Its imminent availability, however, will undoubtedly reduce the marketability of other vehicles.

The specification guidelines developed under the project have resulted in a document which enables infrequent purchasers to understand and specify options which are available in specialized vehicles. TDC believes that the guidelines will increase awareness of vehicle technologies, help bring industry, operators, and users together through common terminology, and make the operators expectations more realistic so that manufacturers can respond.

The Transportation Development Centre has found that among the technologies applicable to transportation for the disabled there is a range of needs which relate to trip distances. For short distances, the needs center around level-changes, stair climbing, and transfer devices. These short distance problems affect virtually all physically disabled people. For longer trips, the automobile is the mode preferred by travelers and the mode which will likely be used by the greatest number. Accordingly future research will concentrate on the short distance barriers and on evaluations of automobiles which can be driven by wheelchair users. A quick-release hand control system for rental cars will also be evaluated. Public (multipassenger) transit research will evaluate the potential for an accessible taxi, modeled on the London cab, and accessibility of intercity bus and commuter rail systems.

It should be apparent from these activities that the national government would like to obtain a full range of vehicles and aids for the physically disabled. Its near-term goal is to create a set of guidelines during the next two or three years which clearly define those needs for all modes and distances. The national government does not have direct jurisdiction over urban transport, but works primarily through associations and their committee structures. This is the major difference between the U.S. and Canadian approach toward research and development for urban transit.

Copies of the Transport Canada Summary and Specification Guidelines reports on Transit Vehicle for the Disabled were made available for this workshop and may be obtained from the Office of Technology Sharing at the Transportation Systems Center, Kendall Square, Cambridge, MA 02142.

SECTION 9

SELECTING A VEHICLE: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

J.P. Golinvaux, District Manager, Public Transit Division, Iowa DOT

Panelists:

Gail Hooker, Wisconsin DOT
Donald Meacham, Ohio DOT
Grovenor (Kip) Grimes, Michigan DOT
Bruce Thomas, Thomas Built Buses, Inc.

SELECTING A VEHICLE: SUMMARY OF PANEL MEETING DISCUSSIONS

J.P. Golinvaux
Moderator

This panel offered participants a professional sounding board for ideas on how to improve the selection process for small public transit vehicles. After reviewing the major factors involved in selecting vehicles, discussions focused on acquainting panelists and the audience with the approach taken by various states in structuring vehicle selections. Secondly, participants were encouraged to identify recurring problems that they encounter with regard to vehicle selection. Thirdly, suggestions for overcoming problems associated with the vehicle selection process were solicited. What follows is a synopsis of conclusions that may be drawn about the vehicle selection process in several midwestern states, the problems participants identified as recurrent issues, a listing of the most salient suggestions participants offered during the panel presentation, and recommendations for dealing with common misconceptions associated with vehicle selection.

Major Vehicle Selection Criteria

To provide a framework for discussions, participants were furnished with a draft section of the Indiana DOT Specification Guide for Small Transit Vehicles.* The group concurred that the vehicle selection criteria as written present a useful set of guidelines, identify the essential decision factors, and could be applied in any of the States represented. The criteria are shown in Table 1.

Approaches to the Vehicle Selection Process

States differ substantially in the amount of local discretion permitted and approach taken in selecting small vehicles. Table 2 provides a summary of the approaches to vehicle selection used in states represented on the panel.

Recurring Problems

Each of the panelists, participants from other states, manufacturers, and vendors were unanimous on the need for establishing a more clearly defined set of vehicle categories. General agreement seems to exist among state officials, manufacturers, and vendors about what to regard as vans and modified vans. However, there is considerable controversy about how to establish homogenous vehicle categories for vehicles with seated passenger capacity greater than 15. State officials expressed a strong sense of dedication to, yet frustration with, the task of creating specifications for such vehicles. It is very difficult to assure that competitive bids are received from vendors offering functionally equivalent equipment. Some of the frustration they experience can be seen in the numerous problems participants identified in discussing vehicle selection. A summary of the problems follows:

*The State of Indiana Specification Guide for Small Vehicles was issued in February 1984. A limited number of copies is available to other States. The contact at Indiana, DOT is Douglas J. Cross (See Appendix E, List of Participants.)

TABLE 1. APPROACHES TO VEHICLE SELECTION

OPTIONS	IOWA		MICHIGAN		OHIO		WISCONSIN	
Agencies May:	16(b)(2)	18	16(b)(2)	18	16(b)(2)	18	16(b)(2)	18
Select vehicle type from categories established by State DOT	Y	Y	Y	Y	Y	Y	Y	N
Establish own vehicle types from market (allowing for competitive bids)	Y	Y	N	Y (1)	N	Y	N	Y
Obtain vehicle thru a State Purchase using std. State specification (minimal local inputs)	Y	Y	Y	Y (2)	Y	Y	Y	N
Obtain vehicle thru a State Purchase using specifications based on substantial local inputs	Y	Y	Y	Y	N	Y	N	N
Buy vehicle locally using Standard State Specification and State oversight	Y	Y	N	Y	N	Y	N	N
Buy vehicle locally using own specification with state approval and moderate oversight	Y	Y	N	N	N	N	N	Y
Use life cycle cost method with State approval of process	Y	Y	N (3)	N (3)	N	Y	N	N
Agency's selection is subject to modification by local planning agency to meet regional priorities	N	N	N	N	Y	N	N	N

NOTES: (1) Michigan makes this option available, but it is not being used.
(2) Michigan holds an annual 1-day meeting to solicit inputs.
(3) Michigan may implement LCC method in FY'85.

TABLE 2. VEHICLE SELECTION CRITERIA

1. Passenger capacity. Careful attention should be given to passenger capacity. The vehicles used in the system should be adequate to carry the maximum number of people at any particular time. In other words, if the highest passenger loading occurs during the early morning and late afternoon, vehicles should be selected that can serve the number of people who ride at those times.

2. Weight capacity. The vehicles should be adequate to carry safely the weight of the total number of passengers to be carried in addition to the driver and any accessories added to the vehicle such as wheelchair lifts, fare boxes, and auxiliary air-conditioning systems.

3. Operating environment. A third factor that should be considered is the operating environment. The environment will influence the type of power train, need for air conditioning, and the turning radius required for the vehicle. For example, if the area has many hills, a heavy-duty engine and transmission would be required. A small city with narrow unimproved streets, or the need to use driveways, could also impose restrictions on vehicle size.

4. Vehicle maintenance needs. Maintenance must be considered in choosing the type of vehicle because different types of vehicles require different types of maintenance capabilities. For example, a van or small bus could be serviced under contract with a local garage, while a regular transit bus or large diesel-powered school bus may require the hiring of specially trained mechanics.

5. Type of service, passenger comfort, and special equipment needs. Passenger and driver needs and comfort levels should also be considered. For example, a standard van will suffice for ambulatory passengers on short shuttle trips, but a raised-roof modified van with a wheelchair lift would be the minimum acceptable for handicapped passengers who are boarding and alighting frequently. Step heights, door aisle openings, aisle widths, headroom, seat spacing and layout, wheelchair accessibility, and safety features are all important components of the overall vehicle package.

6. Fuel type and economy needs. The need to minimize fuel costs or conform with existing fuel and maintenance capabilities will also help determine the type of vehicle selected. However, with the advent of small diesel engines and liquid propane gas, small vehicles are no longer limited to the traditional gasoline powerplants.

7. Budget limitations. Another important consideration is the need to stay within a capital budget. While demand may be best served by a fully accessible diesel coach with a price tag of over $100,000, economic reality may often dictate a body-on-chassis or school-bus type at less than half this cost. The key here is to identify how much is affordable, and specify the best vehicle available in that price range. To do this, the specification writer must have current and accurate information on the types of vehicles available in the market place. However, buying less vehicle than is affordable is not advisable. Many small transit operators have discovered that replacing a $40,000 vehicle every 4 or 5 years is not as economical as purchasing a $90,000 vehicle that will last 10 years or more.

1. In most States, local or in-state vendors lack experience with several of the categories of vehicles needed by rural and human service agencies.

2. Vendors with good local service capabilities may be offering products manufactured by a firm that has a poor product warranty record/reputation.

3. The most affordable vehicles -- in terms of initial cash outlay -- are almost universally constructed by two different manufacturers. First, the chassis is built by a truck manufacturer. Secondly, the body is manufactured and assembled onto the chassis into a final product or "bus". Responsibility for defects in design, workmanship, or materials is more difficult to determine for these vehicles than for vans or standard 40-foot transit coaches.

4. Transportation costs have risen so dramatically over the past decade that it appears possible that the lowest bid may increasingly be submitted by a manufacturer or vendor offering a vehicle that is a poorer selection than that of its competitors simply because transportation cost differentials are so substantial.

5. Local vendors are all too often unwilling or incapable of resolving chronic warranty problems.

6. Orders by most rural states are too small to justify using some of the best quality control techniques used by states with a larger urban population (i.e. states which make larger purchases).

7. Sources of funding for human service agencies and smaller transit systems are so erratic that most administrators and board members approach the vehicle selection process with a built-in bias towards selecting:

   a. the cheapest vehicle and options available,
   b. a smaller capacity vehicle, and
   c. a vehicle with little or no regard for life cycle cost.

8. Chassis model-year changeovers and manufacturer's cost increases are commonly cited as being very unpredictable for vendors and body manufacturers. This is complicated by the lack of any uniform policy on allowing for cost increases associated with these changes by UMTA.

9. Recipients have difficulty in defining needs for vehicles that are suitable for a diverse mix of passengers, such as: children, disabled, and elderly riders.

10. A growing constituency of transit system managers, human service agency administrators and policy board members need to be informed about:

    a. limitations of manufacturers
    b. delivery time
    c. fuel consumption
    d. labor expense

e. federal procurement standards and
f. vehicle suitability for intended uses.

11. There is some confusion over how to consistently describe vehicle passenger capacity:

    a. Van vendors include the driver while the public transit industry doesn't count the drivers.
    b. The number of jump seat positions should be more clearly denoted, since these seats are usually not as comfortable as regular seats.
    c. The number of wheelchair positions should be denoted with consideration for whether the use of any wheelchair position eliminates simultaneous use of any bench seat positions.
    d. The width of each seat position ranges from 17 to 21 inches.

While these are seemingly trivial concerns, the method of counting positions may eliminate otherwise responsive bids from consideration, constitute the basis for a vendor's protest, or confuse board review of bid proposals (especially if award will be made on the basis of the lowest per-passenger cost among bids from competing vendors.)

12. There is little guidance available to buyers on how to include essential safety standards and technical specifications. For example:

    a. Can one rely on "school bus" standards as sufficient?
    b. Are all FMVSS's applicable to each public transit vehicle purchased?
    c. Where may manufacturers obtain a simple interpretation of or obtain certification that their vehicle and any auxiliary equipment meets safety standards?

    Major points of concern are:

    - safety exits
    - roll-over of modified (i.e. raised roof) vans and body on chassis vehicles (current test shows static rather than dynamic strength)
    - lift installations
    - lift designs
    - seating material
    - seat securement
    - passenger restraints
    - seatbelts for ambulatory passengers
    - wheelchair securement devices
    - fuel tank safety
    - step height
    - engine compartment fire prevention.

13. The vehicle acquisition process is too long from initial grant application to actually having a vehicle ready for service.

14. Distinctions between vendor's warranty and the separate body, chassis, or equipment and manufacturers' warranties are difficult to explain to recipients.

15. A crucial problem is how to specify subjective features like ride quality in a fashion that is not exclusionary.

16. Recipients may incur greater costs in obtaining warranty work if bus manufacturers or chassis manufacturers local service outlets differ substantially:

    a. in location (e.g. one may be 10 miles, the other may be 30 miles away),
    b. in ability to schedule work in for service, and
    c. because one or two drivers must be paid to go pick up units, towing charges, fuel, and need for back-up or "spare" vehicles.

17. Recipients, manufacturers, and vendors may give insufficient attention to the correct drive train ratios for the type of service each vehicle will be used to provide. (Low gear ratios have been delivered for over-the-road rural service and high rear end ratios for stop/start city use.)

18. Vandalism and theft have become such problems that all doors should be lockable and a security system is necessary to deter theft or malicious damage to mechanical components.

19. Unnecessary vehicle wear and tear occurs due to the idle time required to provide dial-a-ride service to elderly and handicapped clients.

20. There is heavy turnover among local transit mangers. This results in an inordinately high probability that a person trying to buy or use buses will have had little or no training relevant to vehicle selection.

21. Frequently transit systems try to overcome problems with management, maintenance, driver training, local political support and many other problems by blaming the vehicles.

22. Public procurements almost always involve too many actors, but public transit vehicle purchases appear to involve so many actors now that the whole process may become paralyzed. (See listing of actors in the section on common misconceptions).

Suggestions for Improving Vehicle Selections

1. Revise UMTA policy to allow States to conduct bids for a standardized set of vehicle types on a statewide basis that will remain open for 180 to 365 days.

2. Require all responsive bidders to have an "in-state" outlet or vendor that will arrange for or directly perform warranty work. Measures to assure that this outlet will be in business over each vehicle's useful life should be taken.

3. After a purchase order is issued, hold an "on site" conference with the production managers or engineers for the bus manufacturers. Conduct a "line by line" review of the specifications to identify any need for clarification or ambiguities.

4. Require a "pilot vehicle" be delivered prior to manufacture of the other vehicles being ordered. Conduct a close inspection of this vehicle and resolve any discrepancies between what is expected by the state/recipients and the pilot vehicle the vendor has delivered.

5. When making a bid award decision, establish a uniform way to consider different warranty provisions offered by manufacturers.

6. Provide local recipients with a vehicle catalog that details:

   a. vehicle selection parameters
   b. common limitations of each type of vehicle
   c. advantages of each type of vehicle, and
   d. optional equipment items that are allowable

7. Employ a trained technical staff person to handle recipient concerns about their "unique" problems.

8. Conduct a "vehicle fair" that will allow recipients of Section 16(b)(2) and Section 18 funds to view the equipment currently offered by manufacturers.

9. Request local recipients to specify colors, logo, and to some degree seating arrangement for both functional and psychological reasons. Do not allow for so much local discretion that board members and managers try to design a vehicle that no one manufactures!

10. Invite local recipients to conduct a final acceptance inspection.

11. Require "customer references" from users that have received essentially the same type of vehicle being bid. Three to ten references should be sufficient but a listing of all sales in the past 12 months would also allow one to be certain that the references are representative of the experience with a particular vehicle.

12. Review the manufacturer's Dunn and Bradstreet rating before issuing a purchase contract. Instructions to bidders should explicitly describe the manner in which such ratings will affect the bid review process. Special provisions for start up and DBE firms need to be included.

13. Include in the warranty clause of the purchase contract a provision that the manufacturer (chassis manufacturer too, if possible) will allow as much of the warranty work as possible done "in house" or at least locally. Only serious items should have to go into a shop that is over a few miles away. The chassis manufacturer may supply the parts.

    Vendors may learn in areas where they have sold similar units to several different recipients, that one of the recipients is willing and able to do warranty work on certain items at a savings to both the manufacturer and recipient.

14. Include the type of service that the rear end ratio and transmission ratios should be selected to accommodate in vehicle specifications.

15. Specify master electrical switches that are in easy reach for drivers if they need to exit under emergency situations.

16. Consider new technology applications that may improve vehicle utility and affect the vehicle selection process, even though a technological innovation

may not be purchased as part of the vehicle. For example: innovations in radio communications equipment may make it possible to pick-up a larger number of passengers in a given time period. This will allow larger vehicles to be used. A demonstration projct is under way in Ohio presently. The contact person is Mr. Allen McKinley at 513/732-7144.

17. Establish a quarterly newsletter, or computer bulletin board to provide vehicle recipients (users), state officials, vendors, chassis manufacturers, and body builders with a forum for dissemination of mechanical/technical information.

18. Provide users of transit vehicles with a more direct linkage to the chassis manufacturer's engineering and technical support team. Perhaps a handful of pre-addressed post-cards could be supplied with each vehicle. Presently, it takes an inordinate effort to get through each link in the communication chain without misinformation or aggravation. Transit managers should not have to go thru a vendor, state official, body manufacturer's field representative, chassis manufacturer's field representative and any number of other individuals to talk to a person who can give them definite answers on how to get a $20,000 to $120,000 bus back on the road.

19. Develop, at State level, an easy way to arrange for leases of vehicles between recipients. This would make the delays that occur in delivery easier to absorb, and delivery time could become a less salient selection parameter. States could encourage Section 16(b)(2) and Section 18 fund recipients to delay the sale of safe vehicles being replaced and encourage leases of such vehicles to recipients waiting for new vehicles.

20. Convene, at State level, an annual meeting to review specifications with recipients of Section 16(b)(2) and Section 18 funds. Each type of vehicle should be reviewed. Not all requests for change can be accomodated; but recipient satisfaction with their vehicles will be much higher if they have a chance for input. Similarly, vehicle users should be encouraged to solicit ideas for improving vehicles and vehicle selections from the drivers and mechanics who work with them on a daily basis.

Suggestions for Overcoming Common Misconceptions

As noted earlier, panel meeting participants expressed concern over the number of actors involved in vehicle selection and procurement. Excluding those involved in the direct line of consumers, transportation planners, service providers, manufacturers, buyers, and State and Federal sponsors there are a large number of individuals who often play a role in the processess and frequently require interaction and information. Participants listed some examples of individuals they have dealt with in this process. They include:

State legislators
Planning Agencies/Planning Departments
Local elected officials

City and county managers/administrators
Lending institutions and insurance agencies
Labor organizations
City and county engineers
Private transit and taxi companies

News media
U.S. Senators and Representatives (occasionally)
Special interest groups (especially elderly and handicapped)
Auxiliary equipment manufacturers
Automobile and truck dealers
Local manufacturer's dealers for parts and repairs
Chassis manufacturers
Administrators and board members of non-profits
Political action committees
Students, local universities, and researchers.

To augment their suggestions for improving the vehicle selection process, participants identified some of the more common fallacies that have been encountered with many of the individuals listed above who often have a role in vehicle selections. The common misconceptions which can be anticipated include:

1. "If school buses are good enough to use in transporting young children, then there should be no legitimate basis for eliminating cowl-front school bus vendors from bidding their vehicles in procurements for paratransit service equipment". For optimal service effectiveness, handicapped and elderly passengers require a vehicle that when compared with most conventional school buses offers considerably improved ride quality, maneuverability, lower floor, larger seating area per passenger, better headroom and much better heating and air conditioning.

2. "Wheelchair restricted passengers do not occupy much more space than ambulatory adults." Human service agency staff are often surprised when advised that a 15 passenger vehicle will only accommodate five wheelchairs and lift.

3. "Body on chassis vehicles manufactured by different firms generally use a different chassis." In reality there are only three U.S. manufactured models of van cutaway chassis and only one step-van chassis. For vehicles which use a larger, heavier truck chassis, there are a few more options, including some which are specially built by schoolbus manufacturers.

4. "Human service and transit system administrators believe their situation is so unique that it will be futile to have anyone outside the agency (e.g. a state official) purchase a vehicle that has any chance of being acceptable." Regardless of how unique the environment and services, there are only a few satisfactory vehicle choices available to fit each major category of need. the problem is to obtain the best fit. Since vehicles cannot be individually designed and manufactured to meet each customer's needs, knowledge of vehicles and what can be done with them is as important as knowledge of needs.

5. "There is usually a simple and legal way to make your bid documents reflect common sense concerns." Most of the unsatisfactory vehicles in use today are a result of haste or oversimplification.

6. "Resale value should be a consideration in purchasing public transit vehicles." Vendors have from time to time made this suggestion. However, most public agencies use a vehicle for its entire useful life, and it is ordinarily inadvisable to require vendors to accept used vehicles as

trade-in with a public bid letting. A trade-in provision could make it harder to determine which vendor submitted the lowest responsive bid or could actually stifle "open" competition.

7. "It is possible to develop a specification and contract package which will assure an agency or transit system of trouble free vehicle operation." There are no "trouble free" vehicles being manufactured. Of course, there is substantial variation from bus manufacturer to manufacturer in the types of problems encountered on comparable models. Yet, no vehicle ever selected will be trouble free over its useful life. Rather, specifications should be written in a manner which makes it possible for any vehicle selected using the open and competitive bid process to be repairable for reasonable costs and with a minimum of down time over the vehicles anticipated useful life.

SECTION 10

VEHICLE PROCUREMENT PROCEDURES: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

Enid Magidson, Division of Public Transportation Illinois DOT

Panelists;

Betty Green, RIDES Transportation Project
H. Norman Ketola, Kentron Inc.
Georgianne Riley, Iowa DOT
J. Steven Mann, Blue Bird Body Co.
Larry Temple, Blue Bird Coach and Sales Inc.

VEHICLE PROCUREMENT PROCEDURES WORKSHOP

Enid Magidson
Moderator

The participants in the Procurement Procedures Workshop addressed topics that were raised in a review of a draft of the bid documents, which the Illinois DOT proposes to use in its Section 16(b)(2) vehicle procurement. Illinois' documents reflect a centralized approach to procurement whereby the state goes out for bid on behalf of its Section 16(b)(2) grantees. After the lowest responsive bidder is determined, the grantee agencies enter into individual purchase contracts with the vendor.

The discussion at the workshop are summarized by topic below.

1. Centralized Procurement by the State vs. Separate Procurement by Individual Section 16(b)(2) Grantees

   Based on a six state survey contracted by the Illinois DOT, Ketron, Inc. reported finding that centralized procurement by the State was better overall. However, Ketron cautioned that States should build in opportunities for formal grantee agency involvement and input during the course of procurement. More details of Ketron's survey findings and recommendations are contained in a recently published report entitled 16(b)(2) Vehicle Procurement Study.

   A representative from a grantee agency that had experience with both types of procurements expressed a preference for centralized procurement handled at the state level because there is no approach that offers a better delivery time for the vehicles. It is also extremely difficult and time consuming for Section 16(b)(2) agencies to develop the necessary understanding of all aspects of vehicle specifications and of UMTA competitive bid requirements that are applicable to small vehicle procurements.

   A representative of Pennsylvania DOT described Penn DOT's procedures where Section 16(b)(2) grantees each handle their own vehicle procurements. Penn DOT provides the grantees with a set of written procedures which they must follow as well as providing agencies with standard vehicle specifications. The difficulty of getting Section 16(b)(2) agencies adequately interested and involved in all phases of procurement when it is highly centralized at the State level was discussed. It was suggested that statewide paratransit associations can be extremely helpful in stimulating agencies' interest. Such associations can present comments and concerns to the State on behalf of a large group of agencies. Illinois proposes to look to its statewide paratransit association as a technical committee which will participate in and comment on all phases of the upcoming Section 16(b)(2) procurement procedure.

2. Level of Detail in the Instructions to Bidders and General Conditions Sections of the Bid Documents

   Ketron recommended that as many issues as possible, be addressed in the bid documents so that the business relationship between the buyer and seller is clearly spelled out before purchase contracts are executed. For the most part, Ketron found that the level of detail in the Illinois DOT draft bid documents

was appropriate. Vendors commented that a strict detailed bid document is useful even though this often means that they must spend a considerable amount of time and effort in understanding the documents. Vendors stressed the need for States to be prepared to provide clarification and interpretation of all statements in the documents or to refer vendors to other state agencies for clarification. For example, vendors will need an interpretation of a statement such as "Vehicles must conform to all applicable local State and Federal regulations."

Vendors also mentioned that buyers should expect vendors to be well acquainted with their products and be able to provide very detailed information to the agencies so that the agencies can clearly determine their responsiveness to the specifications. The State must be prepared to guide vendors through the bid documents and to request more information from the vendors if necessary and so ultimately help the vendors to do a better job.

Vendors have found in-plant inspections by qualified engineers representing the purchasing agencies to be extremely helpful. For example, engineers performing in-plant inspections on behalf of Illinois Section 16(b)(2) grantees helped vendors to better understand what was expected and ultimately led to improvements in their product.

3. Standard Clauses Required by UMTA in UMTA Circular 4220.1A

There was considerable discussion on whether all clauses cited in this UMTA publication need to be included in Section 16(b)(2) vehicle procurement documents. UMTA representatives indicated that certain clauses contained in Illinois DOT's draft bid documents could be deleted. These clauses are Patent Rights and Rights in Data. The question of whether the clause on Cargo Preference Use of United States-Flag Vessels had to be included in Section 16(b)(2) procurement documents was discussed. After the workshop, UMTA representatives advised that this clause should be included.

UMTA representatives explained UMTA's new DBE requirements that transit vehicle manufacturers must certify that they have submitted a DBE plan to UMTA and that the plan has not been disapproved. Purchasers must include a provision or clause in their bid documents which requires manufacturers to certify to this effect. UMTA's DBE requirements are spelled out in the July 21, 1983 Federal Register and March 31, 1980 Federal Register (49 CFR Part 23). UMTA is concerned that transit vehicle manufacturers are not aware of this requirement and is now urging them as well as purchasers to be in touch with UMTA regional offices and UMTA headquarters should they need further guidance on this matter.

4. Requirements for Bid Bonds and Performance Bonds

There is concern and difference of opinion on this issue among purchasers and vendors. UMTA is concerned about the impact that specific bonding requirements may have on the level of competition among prospective suppliers and does not require a performance bond for vehicle procurements. Distributors pointed out that when a performance bond is required and the manufacturer is not willing to put up a bond then the distributor has to give a bond to cover an area over which he has no control.

5. Advertising Bid Lettings

States and other purchasers should ensure that they have advertised broadly enough and vendors need to ensure that they are made aware of bid lettings. There was general agreement that it is the joint responsibility of both vendors and purchasers to ensure that they are aware of one another. While the level of effort to notify vendors may vary with the size of the order, it is wise to advertise in at least one trade journal of national circulation such as Passenger Transport. One state, in an effort to complete a vendor listing, placed an advertisement in Passenger Transport prior to their bid letting, asking vendors to contact them if they wanted to be on the state's vendor list.

Vendors pointed out that the location of a distributor's office is not necessarily a good indication of the distributor's service or market area. Purchasers should be aware of this and so not limit their vendor lists to vendors with offices in their own local or regional area.

6. Timing of the Bid Letting

Vendors cautioned purchasers to be aware of the timing of the change in manufacturers' model year when deciding when to schedule their bid lettings. Ordinarily, the new model year begins in late summer. Having a bid letting in process when a model year change is taking place can cause problems for both the bidders and the purchasers.

7. Treatment of Options in the Determination of Bidder

There was general agreement that the cost of options should be a factor in the determination of low bidder. It was suggested that the low bidder be determined on the basis of total price, including the price of options. Bidders should be required to specify, in their bid, the credit that they will allow if the purchaser does not select a particular option.

8. Ensuring Timely Delivery/Damages for Late Delivery

UMTA cautioned that damages for late delivery must be based on the actual cost to the purchasers which may result from late delivery. The daily liquidated damages which the purchaser sets down in the bid documents cannot be an arbitrary sum of money but must be commensurate with verifiable costs resulting from the delay.

9. Use of Life Cycle Costing and Two-Step Procurement

There was much discussion and interest in these topics but apparently little consensus. Critics of life cycle costing felt that it was impractical for use in small vehicle procurements because of the lack of hard data and the difficulty of verifying data on the performance of small vehicles in projects operated, for the most part, by private nonprofit human services agencies. It was also pointed out that the numerous changes in small vehicles, from year to year, makes it expecially difficult to obtain useful, verifiable life cycle costing data.

10. Timing of Vendor Input

The timing and level of vendor input into the technical specifications and related bid documents varies considerably. Vendor input is ensured by allowing a period of time in the course of the bid letting, for vendors to request exceptions, consideration of approved equals, and clarifications to the specifications.

SECTION 11

SPECIFICATION GUIDELINES FOR STANDARD AND CONVERTED VANS: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

Donald G. Meacham, Engineer, Transit Technology, Ohio DOT

Panelists:

Jeffrey Nokes, Geauga County Transit Program, Ohio
Jeffrey Smith, Transportation Resources Inc., Columbus, Ohio
Robert Smeltz, Bureau of Public Transit, Pennslyvania DOT
Michael R. Bruno, The Braun Corp.

SPECIFICATION GUIDELINES FOR STANDARD AND CONVERTED VANS

Donald G. Meacham
Moderator

The panelists in the workshop for Specification Guidelines for Standard and Converted Vans outlined the specification guidelines in their home states of Ohio and Pennsylvania. The panel also included a manufacturer of converted vehicles and two program operators.

PANEL PRESENTATIONS

1. Methods adopted in Ohio presented by Donald Meacham of the Ohio Department of Transportation (ODOT).

Meacham's comments included a discussion of standard vans, converted vans and equipment. He distributed a copy of Ohio's publication entitled "Specifications For Elderly & Handicapped Passenger Vehicles", dated May 1, 1983 which were prepared for the procurement of vehicles and equipment for the UMTA Section 16(b)(2) FY 1982 Program. The specifications also are used by Ohio's Section 18 Programs for the procurement of the types of vehicles specified in the book. The Section 18 Operator modifies the specifications to meet his particular needs. Meacham also referred to a Vehicle Catalog, dated April 1983, which was produced by the Ohio Department of Transportation to assist Section 16(b)(2) applicants and Section 18 grantees in the selection of vehicles and equipment. This catalog was being reprinted by UMTA and would be available for free distribution in early 1984. Meacham described the van series, the light transit vehicle series, and the bus series and discussed problems encountered in modifications of all three. During his presentation, Meacham showed several slides of various items of ancillary equipment for standard vans and converted vans and showed a converted van during the manufacturing (converting) process.

He stressed the importance of writing specifications in a non-ambiguous way to avoid misunderstandings. If mistakes are made, everyone should be notified not just a few firms. The vendors and manufacturers need to have confidence that all bidders are dealt with in the same way.

In Ohio, vendors are not permitted to offer bids that include major exceptions. All input from the vendors must come at the specification writing stage or at a pre-bid conference. After that, the specifications are closed, except if there is an obvious error. A pre-bid conference is recommended to allow everyone a chance to make suggestions.

The specifications should be as comprehensive as possible without being too complex. If they are too simple, the manufacturer does not have enough information to bid on, and then the agencies do not have enough information to evaluate the bids. Meacham outlined the specific differences between the Section 16(b)(2) Program and the Section 18 Program in terms of vehicle purchasing procedures.

Ohio does not favor having a van with a wheelchair ramp in the rear. However, it is a way to provide transportation to one handicapped individual confined to a wheelchair at the least possible cost. The ramps are difficult to work with; they are difficult to

fold and unfold and they are steep. Ramps should be open mesh with no cleats or steps in the center. Steps are more of a hinderance than a help and can cause accidents especially if there is any snow on the step.

Safety flanges are required on each side of all wheelchair lifts in Ohio as well as a flange on the front of the lift that comes up while it is in any position other than fully down. An automatic handrail is also a required safety feature. Lifts may be gravity down but all other actions including stowing and unstowing should be powered.

2. Methods adopted in Pennsylvania, presented by Robert Smeltz of the Pennsylvania Department of Transportation.

The UMTA Section 16(b)(2) funding level for Pennsylvania is about one milion dollars per year. About 25 private non-profit agencies receive funding each year, purchasing approximately 50 vehicles, two-thirds of which are vans. All vehicles purchased with 16(b)(2) funds must be either ramp or lift equipped for handicapped accessibility.

The nonprofit agencies purchase their own vehicles. Procurements range from one to ten vehicles. However, the majority of procurements are for one or two vehicles. The State does, however, set forth vehicle procurement procedures that must be adhered to by the agency to insure that OMB Circular A-102 requirements are met.

Penn DOT must review and approve the agency's "Invitation for Bids (IFB)", which includes technical specifications, before the bid is advertised. After the bids are opened and reviewed by the agency, the State must concur with the agency's selection of lowest responsive and responsible bidder. The agency holds title to the vehicle and is responsible for, upon inspection, accepting delivery of the vehicle.

Vehicle procurement procedures established by the Penn DOT include a sample IFB. The sample is made up of three parts: (a) Instructions to Bidders; (b) General Provisions; and (c) Technical Specifications. The sample is a complete package covering all types of vans and small buses. This is accomplished by listing options applicable to the various types of small vehicles and by a heavy reliance on performance specifications. The sample was developed after meeting with all interested vehicle vendors.

Performance specifications were also used in order to avoid eliminating competition, as sometimes happens when a spec is too technically detailed. However, some van vendors have complained that they should not be held to a performance spec for items that can be factory installed by the original manufacturer. These items include electrical, heating, air conditioning, insulation and lighting. Although performance specifications are the most desirable approach, practical means for proving performance are not always available and it is often necessary to fall back on more definitive requirements.

Performance specifications for roof construction are those mandated by the state, i.e., the FMVSS 220 Rollover Protection Standard. The 220 standard is used as opposed to specifying exactly what the construction of the roof must be (this way all fiberglass body small buses, for example, are not eliminated from competition). All bidders must sign a form certifying that the vehicle offered meets the 220 standard. However, this may not be enough to ensure safety. For example, the State recently

discovered that rollover bars installed on some vans recently sold to agencies were not welded properly. This problem is still under investigation and a final resolution has not been made.

3. A Manufacturer's Viewpoint on Methods of Construction presented by Michael Bruno of the Braun Corporation.

Bruno represented manufacturers of converted vans and discussed in detail how he thought specifications should be prepared and what items and details they should include.

The Braun Corporation's main business is the manufacture of wheelchair lifts for vans and buses. Their entry into the van conversion business took place as far back as 1972 with the innovative design of raised van doors and raised roof vans for handicapped consumers and then later for use as paratransit vehicles.

As direct bidders on these type of vehicles, they find that very few, if any, bid specifications are identical in nature. Because of this, vehicle manufacturing firms must be especially cautious in reviewing bids -- not only to remain competitive but to remain profitable while winning a bid award.

For example, some bids are extremely open ended. One procurement recently requested bids on the following without any further specification:

a. raised height vans

b. lower step

c. positions for wheelchair securement

This type of request is almost impossible to bid in a normal fashion. Because of unanswered questions regarding exact specifications, many extra hours are needed to clarify the options required by the agency.

On the other hand, fixed specification booklets with specification sheets spelling out specific items and including specific dimensions regarding items not only allow for a better bid by a supplier but could actually help reduce the bid price used by the vehicle manufacturer. Pre-bid conferences for larger bids are also an important and worthwhile.

Vehicle converters need to know the quality required in the conversion and this is not easy to detail in specifications. Often bids are won by the lowest bidder, but sometimes give the user agency a vehicle that does not meet his expectations for quality in the conversion, seating, lift, or other items used in the vehicle. Again, this is why specific standards are necessary.

For example, a specially-built roll cage and liner - or carpeted roll bars -can both be designed to meet FMVSS 220. However, they have very different effects on the interior quality of the vehicle. Wheelchair positioning for the best safety of the passenger does not necessarily allow the fastest means of loading; and the safest securement devices have the most difficult means of attaching or detaching by the transportation company driver. Other areas that must be looked at include the following:

- o welding techniques
- o proper seating and aisle space
- o securement devices that properly restain both wheelchair and occupant
- o proper lift location for use of the vehicle
- o proper seating plan for vehicle use
- o use of padding on lifts
- o hangers for belts for belt track securement systems.

Manufacturers rely on agencies to specify the chassis requirements and to make sure they are right for the use of the vehicle. Proper specifications should be given for transmission, engine drive train components, maximum braking surface, cooling systems, engine sizes and tires. Specifications for wheelchair lifts should specify whether they need a handrail, backup emergency system, or wider or longer platform for wheelchair lifts for special use wheelchairs. A minimum 30" x 44" platform is recommended. Lift controls also should be mounted properly for use by passengers.

Timing of vehicle purchases is extremely important especially when the bid is left for bid response in the spring. Various problems at that time could be as follows:

a. the change of model year could dramatically effect delivery.

b. prices -- usually there are no bid allowances left at this time of year or offered by vehicle chassis manufacturers.

Delivery dates for vehicle converters or manufacturers are also important. Vehicle converters depend on chassis manufacturers for lead times and this should be kept in mind when specifying the number of days from date the bid is awarded and vehicles are converted and delivered back to state agencies.

Specifications should be written to obtain the correct vehicle and equipment for the agency's use and not to keep certain manufacturers from bidding.

Buyers should be careful not to over-specify weight requirements when defining lifts and securement devices. Extreme capacities are seldom, if ever, tested properly and could lead to dangerous expectations and liabilities on both the operator and manufacturer. Also, these requirements must be carefully worded to distinguish between lifting, restraining, and crash-protection capabilities. Operators must be made aware of the safe operating limits.

It is extremely important that agencies, as end-users, know what they want or require in a vehicle. Books such as those put out by the State of Ohio Department of Transportation would be extremely important, because it will assist the individual agencies in choosing the proper type of vehicle, vehicle accessories and options necessary for use in their use.

4. A Section 18 Operator's Viewpoint and Experiences presented by Jeffrey Nokes of the Geauga County Transit Program, Ohio.

Mr. Nokes expressed the opinion that agencies should be free to prepare their own specifications so that they get those items that they specifically want. If there were a statewide standardized van for all properties, some money might be saved, but it may cost other agencies more money by buying more than they actually need. Using standard V-8 engines may be satisfactory in one area of the state which is very flat, but in a hilly part of the state the use of standard V-8's would mean running the engines harder with a consequent greater frequency of engine problems. Similarly, radial tires may not be appropriate for an agency that operates a lot on back gravel roads; they would experience more sidewall failure.

Standard inspection forms for the receipt of a vehicle are a good idea. It requires that an agency go through the vehicle and see that everything mentioned in the specifications is on the van. The project manager should personally drive the vehicle for the first 150 to 200 miles before placing the vehicle in public transportation service in order to look for leaks, squeaks, rattles, paint runs and mechanical problems and have them corrected by the dealer.

The Section 18 Program project favors being able to buy a vehicle when it is needed. Agencies should not be locked into a standardized procedure of buying vehicles on a once a year basis. There may be problems with the agency having the local match money available at the time that the state wants to go to bid only in one particular month.

5. A Section 16(b)(2) Operator's Viewpoint and Experiences presented by Jeffrey Smith of Transportation Resources, Columbus, Ohio.

Mr. Smith's comments, based on his experience operating and maintaining vehicles, suggest that radial tires will give an agency from 9 to 12 percent better gas mileage, and that it is possible to get 65,000 miles or more of use from a set of radial tires (or up to 120,000 miles , depending on who is driving).

Agencies should order rubber mats instead of carpeting on their vehicles since they are cheaper, last much longer, and are easier to replace. Carpeting tends to turn black, smell, and rot.

Larger V-8 engines generally work out better than the smaller ones, especially when the vehcle is loaded down hauling people.

Padding on the wheelchair lift is recommended, particularly in the case of an accident. People inside the vehicle can be severely hurt if they are thrown against the lift. Some states require a padding mat which covers the face of the wheelchair lift platform while the lift is in the vertical closed position. However, the lift will protect the vehicle and prevent it from being cut in half or smashed when the vehicle is hit from the side.

A recent wheelchair van accident, as described by Mr. Smith, illustrates the importance of carefully formulated specification guidelines.

"The wheelchair vans that we have gotten have problems. We had an accident about a month ago, one of our vans was hit on the driver's side near the rear bumper, and the van just flipped over on its right side. It was fitted with the earlier lifts, they were installed on taller, heavier vehicles - not really a converted van, it was more like a modified van. It also puts premature tire wear and suspension wear on the right hand side of the vehicle. The lift is on that side, it has a raised roof, and raised doors on the sides. The people that had the side facing wheelchair locks behind the driver had their wheelchairs secured to the vehicle with Collins secured, locks. Since it was a smaller vehicle, there was a seatbelt around the chair and around the passenger. We were hauling small school kids when hit, so when the van fell on the passenger side everyone was hanging in mid-air. Since it was not a head-on collision those front wheelchair locks were not quite as important but I am still amazed that no one was hurt. If they had not had the belts, those children, instead of being suspended, would have fallen. In a standard van, they would have dropped eight or nine feet straight down, right into the wheelchair lift. The lift is the most dangerous thing on there if you have an accident."

GENERAL DISCUSSION

Following the panel's presentation, the session was thrown open for general discussion and questions from the audience.

1. Question Where does Ohio select the location of the wheelchair lift and why?

   Answer: ODOT requires it to be placed on the right side of the vehicle forward of the rear wheels, in most cases, primarily for three reasons:

   a. It's less hard, physically, on the lift (this applies to a rear of rear wheel location on right side or on the extreme rear of the vehicle).

   b. It's unsafe to load a passenger into the vehicle if the lift is located on the extreme rear end and loading and unloading is done in a street.

   c. It's difficult, in areas with extreme winter weather, to get the wheelchair confined passenger to and from a rear end mounted lift through ice and snow.

2. Question: Will manufacturers locate a lift on the rear?

   Answer: Most manufacturers prefer to locate the lift on the side of the vehicle but will locate on the extreme rear end if the buyer insists. Some manufacturers are reluctant to locate on the rear end - Collins Industries has refused to do so. All will locate the lift on the right side to the rear of the rear wheel if there is sufficient room.

3. Question: Does ODOT permit side facing wheelchair positions?

   Answer: In most cases ODOT specifies side facing wheelchair positions for economic reasons. The gain in space (thereby, saving in vehicle size) outweighs the slightly safer position of forward facing. We believe our wheelchair securement and passenger securement systems compensate for the safety factor.

4. Question: What does ODOT do about passengers with upper body control problems?

   Answer: If we know an agency has passengers with this problem, we specify, as an option, a special upper body restraint system. This is in addition to all other wheelchair and wheelchair passenger securement systems.

5. Question: Don't you think it's safer to transport wheelchair passengers in a forward position?

   Answer: Meacham replied that yes, it was safer to transport them forward facing, according to test results. However, actual accident records in Ohio have not indicated serious accidents to wheelchair passengers being transported in side facing positions as long as they and the wheelchairs were adequately secured independent of each other.

6. Question: What is Ohio going to do about meeting DBE requirements?

   Answer: ODOT intends to follow UMTA guidelines and require statements from bidders that they have met UMTA DBE requirements or have filed for certification.

SECTION 12

SPECIFICATION GUIDELINES FOR VAN CUTAWAY AND STEP VAN CHASSIS VEHICLES: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

Patrick B. Simmons, Project Management Specialist
Public Transportation Division, North Carolina DOT

Panelists:

Frank A. Varker, Varker and Associates
Lloyd Clark, Arizona DOT
Cheryl Johns, Orange County Transportation District
Michael Dirnberger, National Coach Corporation
Roger Hess, National Coach Corporation
Bruce Thomas, Thomas Built Buses, Inc.

SPECIFICATION GUIDELINES FOR VAN CUTAWAY AND STEP VAN CHASSIS VEHICLES: SUMMARY OF PANEL MEETING DISCUSSIONS

Patrick B. Simmons
Moderator

The 26 participants of this panel session represented:

11 manufacturers and distributors
7 State DOTs
4 local transit operators
2 research and consulting firms
2 UMTA Offices

The mix of buyers, users, and manufacturers of these intermediate-sized vehicles led to some highly spirited discussions on how transit agencies can obtain the most cost-effective vehicle that meets their needs.

Frank Varker began the panel presentations with a discussion of specification development from a consultant's perspective. Mr. Varker has been working with Ketron, Inc. on a 16(b)(2) vehicle procurement study for Illinois DOT. The study included recommended procurement procedures and a set of bid documents and vehicle specifications appropriate for Illinois operators. Copies of the draft specification for a 20-passenger vehicle were made available to participants.

As a result of this study, the consultants concluded that Illinois 16(b)(2) operators would be best off with four classes of vehicles: standard vans, converted vans, van cutaways (up to 20 passenger) and body-on-chassis vehicles using a school bus chassis (24 to 32 passengers.) Their recommendation leaves out vehicle constructed on a step-van or motor home chassis, based on gross vehicle weight, maintenance, and cost considerations.

The study included a survey of seven Illinois transit agencies, typical of small and rural operations with average mileages of approximately 24,000 miles per year. The survey identified several types of problems:

- o excessive out-of-service time because of distances to dealers
- o difficulties in obtaining warranty work
- o high engine failures
- o excessive brake wear
- o air conditioning failures
- o water leaks around doors and windows

Available data on maintenance and repair costs was limited and not sufficient to establish statistically representative figures for Illinois. However, the pattern of overall results were consistent with data from operations elsewhere, although the Illinois figures were consistently lower than national averages. After an initial period of wide variations among individual vehicles, the costs appear to level out roughly as follows:

Type	Maintenance Costs (¢/mile)
New Model Vans	3-5
Cab-Chassis Cutaway	5-7
School Bus type	8-10

From an engineering standpoint the best engine/chassis combinations do not come with the best brake configurations. This problem is inherent in the chassis which are currently available on the market. Improvements can be made by adding brake retarders or specifying larger displacement engines. Also, the addition of tag or dual axles may be a valid approach to resolving brake problems. However, all of these solutions cost money, and the value of such additional investments has not fully been established.

Mr. Varker noted that the term "heavy duty" should probably be stricken from specifications because it oversimplifies and ultimately leads to dissapointment. He urged buyers to be detailed and specific.

Lloyd Clark of the Arizona DOT reviewed the 16(b)(2) vehicles purchased by Arizona. The Arizona DOT has sponsored workshops as a mechanism for developing and coordinating specifications. The latest workshop brought together vendors and users of small vehicles to provide the State with a consensus of recommendations for specification requirements. It was successful, both in generating realistic requirements and as an educational medium. Parallel sessions addressed vehicles for ambulatory and wheelchair access. Arizona DOT provided the introductory and working materials and chaired the meeting.

Cheryl Jones, Manager of Procurement for the Orange County Transit District (OCTD) in California spoke on correct and incorrect procurement methods.

For its major fleet purchase, OCTD specified an 18-foot van cutaway with a "dream" lift. Unfortunately, the desired vehicle did not exist and could not be built within practical cost constraints. The initial set of bids was rejected and the specification rewritten. On the second round, bids were let, the lowest bidder was awarded a contract, and shortly thereafter the contractor filed for bankruptcy in another State.

At this point panelists entered into a spirited discussion on the efficacy of performance bids. Many of the participants in this group believe strongly that bonds of up to 100% should be routinely considered in the development of all procurement packages for small vehicles.

The OCTD procurement story did have a happy ending, however. OCTD used an outside consultant to inspect manufacture of the vehicles and to conduct the acceptance inspection. The final version of the specification included some unique features which will be of interest to other agencies. The specification called for a single large capacity fuel tank and electric brake retarders on all vehicles. Copies of the draft 1984 specification for this vehicle were distributed at the general session. State DOTs may obtain a current revision by contacting Cheryl Johns at OCTD (See Appendix E, List of Participants).

Michael Dirnberger and Roger Hess of National Coach Corp. compared van cutaway chassis and step van chassis specifications. They also contrasted these with standard van dimensions and confirmed that brakes as used in transit service are an inherent design problem with available chassis.

The National Coach representatives presented slides showing National's method of construction, part of which addresses "beefing up" of electrical components for sustained stop-and-go, lights-on, and lift operation. As with other manufacturers at this workshop, National stressed the importance of buyers knowing exactly what they want and developing detailed design specifications.

During this portion of the meeting, participants debated the merits of life cycle costs and design vs. performance specifications. Generally, participants agreed that life cycle costs considerations were beneficial to the procurement process and that performance specficiations were desireable, but often did not provide sufficient specificity for buyers to be sure of getting exactly what they needed.

Bruce Thomas, Commercial Sales Manager for Thomas Built Buses, Inc. reviewed features of both a 12,500 GVWR (Gross Vehicle Weight Rating) and a 14,000 GVWR step van chassis. He also described the Thomas approach to manufacturing both the chassis and steel school bus bodies.

Thomas is a supporter of performance specifications. They believe that design specifications require the procuring agency to have the engineering skills necessary to define exactly what is needed and a willingness to accept a high degree of responsibility for the vehicle's ultimate performance. Detailed design specifications also may impose some limitations on vendor responses to the bid invitation. By contrast, performance - based specifications leave more design detail open to the manufacturer and can facilitate greater competition.

Thomas urged evaluation of warranties as an approach to obtaining better life cycle costs.

Need For Further Interchange. An additional recommendation derived during discussions at this panel meeting was offered during the closing general session. Several manufacturers noted that although vehicle manufacturers and chassis suppliers maintain close engineering coordination, their meetings seldom include knowledgeable buyers or users of the vehicles. A workshop of this type could have provided an unusual opportunity for vehicle and chassis manufacturers to address the problems inherent in adapting available truck chassis for transit use. According to those present, the chassis manufacturers would be helpful and would also benefit from a comprehensive view of the needs of this segment of their market. A separate meeting, focusing on chassis requirements or a parallel session at the next workshop was suggested.

SECTION 13

SPECIFICATION GUIDELINES FOR TRUCK CHASSIS AND SMALL INTEGRAL VEHICLES: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

Grovenor (Kip) Grimes
Bus Transit Division, Michigan DOT

Panelists:

Stanley DeBarr, Isabella County Transportation Commission, Michigan
Kathleen Gaffney, Southeastern Michigan Transportation Authority
J.P. Golinvaux, Iowa DOT
Wayne Bell, Technical Bid Manager, Flxette, Division of LTP Inc.
Steve Mann, City Bus Eastern Sales Representative Blue Bird Body Co.
Mike Marlatt, Ontario Bus Industdries, Inc. (Orion)

SPECIFICATION GUIDELINES FOR TRUCK CHASSIS AND SMALL INTEGRAL VEHICLES: SUMMARY OF PANEL MEETING DISCUSSION

Grovenor (Kip) Grimes
Moderator

About 25 people representing a good cross section of people from the small bus industry, participated in a detailed discussion of technical specifications for small buses under 25 passengers. Perhaps the most productive aspect of this session was the input from the manufacturers' representatives. So often the manufacturers are asked to bring their buses to conferences for a show but are never asked to directly participate in the conference sessions.

The Michigan Department of Transportation's (MDOT) specifications for a 24-passenger bus were used as a basis for discussion. A line-by-line review ensued with many useful ideas presented by the panel and members of the audience. This section includes a side-by-side analysis with the MDOT specifications on the left and a summary of the related discussion on the right.

As well as the points highlighted by this side by side analysis, the last portion of the discussion centerd on the bidding process itself. Various methods of determining the successful bidder were discussed.

1. Low base bid.

2. Low bid plus all options (additive bid).

3. Two-step bidding using life cycle costing.

4. Lowest bid plus options up to a maximum amount per unit. Options are prioritized.

The fourth alternative appears to be the most equitable and avoids the problem of the bidder going low on the base bid and high on the options in order to get the bid.

The importance of pre-bid meeting, factory inspections and final inspection forms to ensure a proper record of the purchasing and acceptance process and that purchaser is truly getting a product which meets the specifications was stressed.

MDOT
24-PASSENGER SMALL BUS
SPECIFICATIONS

Introduction

The purpose of these specifications is to provide for a compact bus capable of seating 16 to 20 ambulatory adult passengers and 2 wheelchair passengers, also 24 adult forward- and aisle-facing passenger nonlift buses. Vehicles must meet all applicable Federal Motor Vehicle Safety Standards. A successful bidder shall quick title and deliver the vehicle and title to the location specified by the State of Michigan. The successful bidder shall have a facility and personnel in Michigan capable of handling final inspection and corrections required by the state prior to acceptance of the vehicles. The bidder must also be capable of handling in the field warranty and ongoing repairs throughout the State of Michigan. Any deviation from these specifications shall be approved by the State of Michigan.

Body Structure

The coach shall have a heavy-duty unit, body-type structure. The body structure shall be of durable steel construction, adequately reinforced at all joints and points of stress with sufficient strength to support the entire weight of a fully-loaded vehicle on its top or side, if overturned. A copy of the FMVSS220 roll-over protection test results to be furnished with bid.

The bus shall safely withstand road shocks and other conditions found in Michigan transit bus service. The body shall be securely fastened to the underframe structure so that the entire frame shall act as one unit without any movement in joining. Front, side, and back panels shall be secured to the floor frame members and posts so as to result in a permanent, fully-integrated structural unit adequately reinforced with steel posts and rails at all points where stress concentration may occur. The vehicle shall adequately carry loads for which it was designed. All exterior panels shall have the physical properties equal to 20 gauge steel on the sides and 16 gauge steel at the corners, front panels, and other locations requiring additional strength. Interior panels shall have the physical properties of 24 gauge steel and shall be covered with a scuff-resistant interior trim material. Reinforcements shall be installed around door openings in order to transfer stress around the opening.

Exterior panels shall be sufficiently stiff to prevent vibration, drumming, or flexing while the bus is in normal service. Lower skirt panels to be sufficiently fastened and braced to prevent ice and snow build up damage. When panels are lapped, the upper or forward panels shall act as a watershed. Sealing and fastening of joints shall prevent entrance of moisture and dirt. All exterior panels shall be buck riveted and bonded or welded to the body frame. Use of nonmetal body panels shall require concurrence of the state.

Exterior and interior panels shall be given a thorough anti-corrosion treatment.

Gun installed huckbolt fastenings, buck rivets, or approved equal shall be utilized on all exterior body panels, rub-rails, and all other locations where stress is concentrated. Where huckbolts cannot be used, all nuts, bolts, slips, washers, clamps, and like fasteners on the exterior and interior of the unit shall be zinc or cadmium plated to prevent corrosion. No sheet metal screws shall be permitted. In no case shall the sealing of the panels be dependent on caulking alone.

DISCUSSION

Introduction

Federal Motor Vehicle Safety Standards - It was pointed out by the manufacturers that specifications often make references to general standards, such as federal safety standards, with no specific numbered references. Thus, the burden is on the manufacturer to determine which of the specific standards apply to the bus. Consensus was that, wherever possible, specific numbered references should be used.

Final Inspection and Warranty - This requirement is critical to ensure that the delivered vehicle actually meets the specification. While it would be desirable to do a final inspection at the factory, this is not always possible. A service facility located in the service area of the purchaser will facilitate final inspection. Of equal importance is the manufacturer's ability to follow up on warranty items. In some situations, the manufacturers on the panel indicated that they would authorize the transit agency to have an item fixed locally and then bill the company for the work. Prior approval must be obtained from the manufacturer before the work is started.

Body Structure

FMVSS 220 Roll-Over Test - Everyone agreed that the 220 requirement leaves something to be desired, as the test was originally designed for school buses; however, no other viable alternative was presented. It was suggested that in lieu of physically running the 220 test manufacturers should be able to certify through an engineering analysis that the deflection standards in the test would be met. This would be a questionable practice especially for companies just entering the transit market.

Interior Panels - The panel felt that other alternatives to steel, such as molomein should be included. Michigan has accepted other types on a case-by-case basis.

Exterior Panels - All panels must be riveted and bonded or welded to the body frame. Sheet metal screws should not be permitted, as they will loosen up over time.

Passenger Door and Stepwell

Provide a driver-actuated door either heavy-duty manual or power-operated with control located conveniently for the driver to operate. Door to be double folding-split type with a flexible soft rubber cushion at least 1½" in width on the meeting edge, and at bottom of doors for seal to stepwell. Door to be located on right side of the vehicle behind the right front wheel. Clear opening entrance with minimum of 25" door opening width. Door opening height 72" minimum from top of first step to door header. All steps and stepwells to be stainless steel 16 gauge minimum with adequate structural bracing, also all stepwell screws and hardware metal to be stainless steel. Ground to first step not to exceed 11' ± 1" in height, each additional vertical step to be 9" maximum with all tread depths to be 9" minimum.

Passenger Door and Stepwell

25" minimum door width may be too narrow. 27" minimum may be more appropriate. In lieu of 11" minimum first step height, a neumatic outside step was suggested. It was agreed that moveable steps will malfunction most of the time, especially if the mechanism is exposed to the weather. A permanent outside step will work in some applications if a nonskid step tread is used. Any metal other than stainless steel will result in severe corrosion problems and eventual loss of structural support. Fully enclosed stepwell is still the best design.

Interior

74" minimum interior height at center aisle, 6" from wall 67" minimum with gradual contour to center aisle (no bulkheads).

90" minimum interior width.

All interior panels to be vinyl coated metal or equal. Below lower window line a dark color, window area, and above to be light color. All materials and treatments shall be flame retardant to meet FMVSS 571-302 and treated to be easily cleaned. Colors of covering shall harmonize with exterior vehicle colors. Panel fastening devices to match color of panels.

The interior is to provide a pleasant atmosphere, esthetically pleasing (not school bus interior).

The door and instrument panels are to be painted, or otherwise finished with a nonreflectant, antiglare finish to match the overall interior tones of interior panels.

The interior design and colors to be approved by the state.

All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be padded with a heavy-duty, vinyl covered, energy absorbing material. Items to be padded are to be approved by the state.

Interior

Interior Heights - 74" minimum center isle interior height is a must. Some small buses do not meet the minimum 67" height at the outside walls because of A/C ducts, or lighting channels. This is undesirable and should be avoided.

Flame Retardent - Michigan specs call for FMVSS 571-302. It was suggested that the ASTM Radiation Test would be more appropriate.

Interior Asthetics - The Michigan specs state that . . . "The interior is to provide a pleasant atmosphere, asthetically pleasing (not school bus interior)." There was considerable discussion over the vagueness of this section. The original purpose was to avoid the low bid of a school bus painted another color. This is no longer a problem as all of the school bus manufacturers are now producing public transit vehicles. This statement combined with the description in the previous paragraph does make it clear to the bidder that a transit quality interior is required.

Interior Padding - Padding of all sharp edges, corners especially lift mechanisms is vitally important.

Gauges

Vehicle shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable):

1. Ampmeter with graduated charge and discharge, both ampmeter and its wiring to be compatible with generating capacities (voltmeter may be substituted).
2. Oil pressure gauge.
3. Water temperature gauge.
4. Fuel gauge.
5. Air and vacuum assisted operated accessories shall have pressure gauges easily readable by driver.

Gauges

Oil pressure gauge should be direct reading and not electronic as they are unreliable. Michigan only requires needle gauges. It was suggested that "idiot" lights be required as a back-up. No additional gauges were suggested.

Farebox

Farebox is to be Main Farebox Model M-3D with left-hand trip handle, Diamond Modified Model D or equivalent. It shall be mounted on a stanchion, adequately braced, located near the driver and easily accessible to passengers entering bus. A farebox light shall be connected to the dash instrument lights. Two interchangeable lockable farebox vaults and farebox, keyed alike, with a double set of keys for each lock shall be supplied. Vault and farebox exteriors shall be marked with key reference.

Farebox

No comments.

Spare Tire

One additional tire and rim to match that which is on vehicle shall be provided with each bus.

Spare Tire

Michigan does not require the tire to be tied down as it is always stored at the garage and not carried in the bus where it takes up space. The driver couldn't change the tire anyway. This led to a discussion of the importance of two-way radios in all transit buses.

Bumpers

Front and rear, high energy absorbing bumpers (Romeo R.I.M., Inc., Help Bumper, or equal) with antiride capability. Structural design to be approved by the state. To have a full across mud flap at rear bumper area to reduce dirt collecting on rear of bus.

Bumpers

Everyone agreed that energy absorbing bumpers are effective.

Floor

The floor shall be covered with minimum 5/8" BC exterior plywood with sealed edges. The stepwell, entrance area, and center aisle floor area shall be overlayed with ribbed, commercial rubber flooring. Floor in seat area to be smooth commercial grade ACE rubber, RCA, or approved equal having antiskid properties. Step treads shall be ribbed rubber flooring. All step edges shall have a band of bright contrasting color running full width of step. Color of all flooring to be approved by the state. Vapor and fume proof panel to match flooring in floor to provide access to fuel tank sending unit. Wheel wells to be constructed of 14-gauge galvanized steel minimum, with continuous weld to reinforced H.D. duty floor pan. Wheel wells to be covered with rubber flooring same as floor. All metal hardware and fasteners to be stainless steel.

Floor

The only comment on this section related to the thickness of the commercial rubber flooring. It was suggested that 1/8 inch flooring and 3/16" step tread be the minimum required.

Emergency Exit

A rear door shall be provided in each vehicle with H.D. fastening devices for opening inside and outside of body which may be quickly released but designed to offer protection against accidental release. Label inside rear door with opening instructions.

All doors except passenger door shall be lockable by key from exterior. Heavy-duty exterior key locks to have weather shields.

All emergency exits shall be marked and with instructions for proper use.

All doors to have H.D. bolted on hinges to interior reinforcement that are convenient to lubricate.

No seats or other objects shall be placed in bus which restrict passageway to rear door to less than 16".

Emergency roof escape hatch 23" x 23" minimum that, when open and the bus is in a forward motion, will provide fresh air inside the bus. Transpec Inc. DMA 1122, or equal.

Emergency Exits

It was generally agreed that a rear door exit was preferable in emergencies and should be required. Rear window exit was also suggested. Exterior emergency exit markings were suggested to aid rescuers in case of an accident. It was also suggested that this would aid vandals in entering the bus. It was agreed that emergency roof escape hatches are an important and necessary safety item.

Towing

Tow hooks shall be mounted to chassis frame and adequately braced, two in front and two in the rear of the bus of sufficient strength to tow one and one-half times the G.V.W. rating of the bus. They are to be properly installed so that bus can be safely towed and lifted without damage to the bus and bumpers. The bidder shall provide the towing procedure to be followed.

Towing

No comments.

Rustproofing

When completed, the unit shall be rust and corrosion proofed both internally and externally with polyoleum, Tuff-Kote, Ziebart, or equal. The coach shall resist corrosion from atmospheric conditions and road salts.

Rustproofing

Suggested that auto dealer rustproofing be prohibited and if at all possible rustproofing should be done at the factory while the vehicle is under construction.

Mirrors

Interior mirror 6" x 16" minimum shall be provided to afford a view of passengers. Mirror shall be metal backed and framed, with rounded corners and protected edges.

Mirrors

Do not leave mirror locating to the people at the factory. Mirrors should be set personally either at the factory or at the sales outlet. Locating 4" convex mirrors is

Two flat exterior, clear view, rear-view mirrors, at least 10" x 6" also 4" minimum convex mirror shall be mounted separately, one to the left and one to the right of the driver. Each mirror shall be firmly supported and adjustable to give driver clear views past left rear and right rear of bus. Final location of exterior mirrors to be decided at pilot model inspection. Retractable hinged mirror brackets and head to be stainless steel (transit-type mirrors preferred). Exterior mirrors to be mounted with a sufficient size reinforcement plate behind mounting surface, minimum ¼" thick plate.

very difficult. It was suggested that 8" convex mirrors be used on the front fenders instead of the 4" mirrors. Mirrors must also be carefully placed so as not to create site line obstructions to the right or left.

Seats

1. Driver's Seat

The driver's seat cushion and back shall be full depth neoprene foam with a cover of transportation grade velour fabric, color coordinated with passenger seats. Suspension seat shall have vertical fore and aft slide, back pitch, and cushion tilt adjustments. Certified seat belts with retractor shall be attached to seat frame. Bostrum Viking 303 with headrest, or equal.

Seats

Driver's Seat

Michigan specs call for the Bostrum Viking 303 or equal. Suggested that a generic statement be provided instead or call out two or three additional makes.

2. Passenger Seats

Passenger seats shall be two passenger, forward and aisle facing, 35" minimum width or single passenger 18" minimum width. Knee to hip room between seats 27" minimum. Passenger seat back shall be fully padded, or energy absorbent material with padded handle at top corner aisle side. Otaco 221TCG, American Seating TC-6464 or equal. Aisle shall be 16" minimum width.

Passenger Seats

35" minimum for a double seat was questioned 36" should be the minimum cushion width with a 16" isle. Sloping sidewalls can reduce these dimensions at shoulder height. No more than 1" reduction should be allowed on each side.

3. Wheelchair Lift-Equipped Buses

Two fold-up, double seats, one facing forward and one facing toward rear, provided in the wheelchair securement area. The seats shall be of the same design as the other passenger seats, Otaco 221TCGF, American Seating TC-6464HC minus wheelchair locks, or equal. Bottom seats to have bumper to hold wheelchair parallel with seat. See wheelchair securement area.

Wheelchair Lift-Equipped Bus

The fold up double seat design has been very effective in maintaining usable seating inside the vehicle while also providing two wheelchair locations (see diagram).

4. All Seats

Seats to be contoured for occupant comfort and retention. Floor anchorage shall be neat and non-trip design. Seats to have 2" back pitch behind handicap area. Cushion and back shall be full depth neoprene foam padding covered with transportation grade 40 oz. minimum, expanded vinyl coated fabric, meeting the requirements of Federal Specification CCC-A-680a, Class II, Treatment A1. All materials in seat cushion shall meet the flammability requirements of ASTM E-162.75. All seats and seat mountings to meet applicable Federal Standards. The seating arrangement and configuration shall be approved by the state. Alternate seats shall be approved by state prior to bid opening date. Seats to be two colors approved by the state.

All Seats

ASTM flammability requirements should be reviewed. Also suggested that more research needs to be done to design the interior of the vehicle with human factors in mind.

Grab Rails, Stanchions

A floor-to-ceiling stanchion shall be provided in close proximity to the driver with provisions for attaching the farebox. A guardrail shall be provided in back of the operator, extending from the vertical stanchion to the left side of the coach 30" ± 2 above the floor and a padded modesty panel from guardrail to the floor (exception, not provided in lift vehicle). This stanchion shall not impair driver's seat adjustment.

Left and right side entrance grab rails shall be positioned so passengers entering vehicle will not use door opening device for support when boarding the bus. Padded vinyl clad, heavy-duty modesty panel shall be provided to the left of the entrance door with a floor-to-ceiling stanchion provided at aisle. The guardrail shall be 30" ± 2 above the floor, (in case of lift vehicle, provide floor-to-ceiling guardrail and modesty panel to rear of lift).

Grab Rails, Stanchions

Considerable discussion took place regarding the location of hand rails needs to enter the bus. Michigan requires fold out doors so that grab rails can be positioned inside the door. Even so, passengers tend to grab the door opening device.

Energy absorbing padding on stanchions must be premolded, otherwise they will soon be twisted off and destroyed. Reinforcing plates must be used for stanchion mountings or they will soon be torn loose.

Two full length transit-type ceiling grab rails shall be provided and securely attached to roof section. The guardrails and all stanchions shall be a minimum of one inch outside diameter steel covered and glued with heavy, premolded, energy-absorbing padding except ceiling grab rails which shall be stainless steel. All grab rails and stanchions to be positioned so as not to interfere with wheelchair movement. All stanchion mountings to have reinforcement plates welded to structure behind panels of sufficient strength to withstand passenger force.

Sunvisor

A large transit type, fully adjustable plexiglass sunvisor will be provided for the driver windshield and side window.

Sunvisor

No comments.

Interior Lighting

Overhead entrance and stepwell lights shall provide to ensure no less than two foot-candles of illumination on the entrance step area with the door open. This system shall be illuminated automatically when the door is open. Overhead and stepwell lights shall be wired to and activated automatically by door control and by a separate dash mounted switch. Stepwell light to be on side away from wheel splash. Adequate interior lighting throughout to provide maximum candlelight at a reading level. Interior lighting fixtures shall be reasonably flush with the interior walls and ceiling so as not to present a hazard to the passengers.

Light to be designed to illuminate lift platform for night operation. Lift switch to be door actuated on-off with driver override.

Interior Lighting

Critical areas are the stepwell where the light must be positioned to light the stepwell but not be affected by dirt and salt, water, and ice. An overhead light may be the most effective location to provide adequate light. Another critical area needing lighting is the lift platform.

Exterior Lighting

Exterior lighting shall be in accordance with Federal Motor Carrier Safety Regulations (§ 393.12). Marker lights to be armored. Lights to be grounded to body framing structure. All lights to be sealed from moisture and the mounting to body to be sealed.

Exterior Lighting

No comments.

Safety Equipment

All safety equipment shall be secured to vehicle, easily accessible to the driver.

1. Ten-unit first-aid kit.
2. Five-lb. rechargeable type 2A-10BC rating fire extinguisher with metal head. Must have a gauge to indicate state of charge.
3. Triangle warning devices in container that meets FMVSS 125.
4. Four 30-minute flares in closed container.

Safety Equipment

No comments.

Heating

Front and rear heating systems sufficient to maintain 60°F at knee level throughout interior of bus when outside temperature is 0°F and the bus is traveling 55 mph, or during stop and go operations. Stepwell to include heat duct or sufficient heat to prevent icing. Front windshield defrosters and 6"-chrome fan to be mounted in driver area for increased circulation. Combined heater capacity to be 65,000 BTU minimum. Front heater is largest available from chassis manufacturer. The bus is to have ventilation by driver's feet and in front of passenger door for driver and passenger comfort in summer.

All heat and air-conditioning lines and hoses are to be sufficiently protected and insulated to ensure against wear from friction and the elements (interior routing if possible).

Heating

Discussion centered around the temperature requirements vs BTU minimums. It was generally agreed that both should be in the specs to ensure passengers comfort. Proper insulation and sealing of joints are also critical to maintaining heating levels. It was suggested that blankets should be carried in the bus in case of heating failures or vehicle breakdowns.

Windows

Horizontal-type sliding transit windows with double-density safety glass and adequate locking features. Windows to meet FMVSS217 for emergency exits, if applicable. Windows to be constructed so they can be opened to allow ventilation throughout the vehicle. All glass is to be tinted, passenger windows AS-3 glass and meet applicable federal standards.

Windows

"Windows to meet FMVSS217 for emergency exits, if applicable" is a vague statement and shall be clarified to specify number of emergency exits required.

The rear window shall have wide angle view lens to improve vision directly in back of bus. (Vangard made by Optical Sciences Group or approved equal.)

Paint

Paint to be "Dupont Imron," or equal, with two color combination per state requirements. Scheme will be supplied to vendor.

Lift vehicle shall display the international symbol of accessibility. (One each on vehicle's left and right side.) Location to be determined at pilot model inspection.

All wheel rims to be painted white.

Insulation

Inside walls, ceiling and fire wall area to be adequately insulated for Michigan winters with spray foam type, nonformaldehyde, fire-resistant, nonhygroscopic resistant to fungus, material to prevent condensation and thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger door closed. Insulation to meet interior fire retardant spec under Interior Heading.

Wheelchair Lift

Wheelchair Securement Area

Located against coach wall opposite lift behind driver's seat. Provide two wheelchair locations facing aisle, to include:

1. Four wheelchair restraints, semiautomatic type with release handle located for driver's ease to operate. Collins or equal.

2. The two-wheel chair restraints that are close together are to have heavy-duty, padded covers when not in use.

3. Extra long certified seat belts with heavy-duty retractors with sleeves to keep belts off floor shall be provided. Two sets for each wheelchair occupant.

4. Seating - refer to seating section.

5. All items in this are to be approved by the state.

Lift Option 1.

Lift incorporated into stepwell such that able bodied passengers can board the bus in a normal manner with the use of a power step extension. The ground to first step to be 11" ± 1". Each additional vertical step to be 9" maximum; all tread depths to be 9" minimum.

Loading of wheelchairs is accomplished by a mechanism which converts the stepwell into a platform. Lift platform width to be 32" minimum. Lift platform length to be 42" minimum. Lift operational mechanism to be shielded against weather and road debris.

Lift capacity minimum 750 lbs.

Supply a device so that if failure occurs, lift can be operated manually.

Platform to stop automatically when lowered to ground level. Platform must stop or descend in a slow, even manner, even if failure occurs. Speed of lift operation must be safe, constant and steady for passenger comfort.

Lift platform to include automatic locking safety wheel stop to prevent wheelchair from rolling off.

Controls to be conveniently located for easy operation from outside or inside the vehicle.

Lift in step position to raise and lower to ground.

Lift color to blend with interior colors.

Paint

Most states leave the color selection up to the local properties. Michigan has limited the factory paint to two colors as many systems have multiple color schemes which are better painted on site.

Insulation

Discussed alternatives to foam. Some favor fiberglass bats for ease of repairing body panels. Foam, however, does a better job of sealing up the vehicle and does not settle as fiberglass does. Fire retardent requirements must be met.

Wheelchair Lift

No two people agree on the best methods of transporting wheelchair passengers. Everyone agrees, that for high floor buses, lifts must be used as opposed to ramps. The lift must meet the minimum dimensions indicated in the Michigan specs, although it was suggested that the minimum platform width of 30" is not sufficient for all types of wheelchairs. Also suggested that there be a safety interlock with the emergency brake so that the lift cannot be operated unless the emergency brake is set.

Michigan positions two wheelchair locations against the side wall using both wheel locks and seatbelts with retractors, one set for the wheelchair and one set for the passenger. The use of double folddown seats means no loss of seating when wheelchair locations are not in use. Forward facing wheelchair locations are probably preferable but far more difficult for the driver to secure quickly and easily. Quick release attachments must also be used so that obstructions are not left out for people to trip over.

Lift Option 1.

Very limited experience with stepwell lifts in small buses. In Michigan, none of the bidders are bidding this option.

Lift Option 2.

Separate door opening for Collins Saf-T-Lift, or approved equal. Lift mounted within bus body on the right curb side between entrance door and rear wheel. Minimum door height of 67" from floor to top of door opening. Doors equipped with an interior locking device and outside handle. Outside fasteners to be provided for each door so that they can be locked in an open position. Lift to be dual cylinder, electro-hydraulic, or electro-mechanical type. If lift has a crossbar, it is to be above door opening and well padded.

Lift mechanism for power up, power down, and power fold operation, including a manual safety override for complete lift operation with device for driver's ease, safety, and approximate to normal operating time. Platform to stop automatically when lowered to ground level. Entire assembly to be installed inside the bus body with adequate protection to prevent accidental injury to passengers.

Speed of lift operation must be safe, constant, and steady for passenger comfort.

Lift capacity minimum 750 lbs.

Usable platform width 30" minimum.

Usable platform length 42½" minimum.

Lift platform to include automatic locking safety wheel stop to prevent wheelchair from rolling off.

Platform to automatically stop at floor level.

Controls to be conveniently located on a flexible cut resistant cable for easy operation from inside or outside the vehicle.

Platform, bridge plate, and area between bridge plate and aisle to be skid resistant.

Bridge plate and platform to be rust resistant.

Horizontal grab rail on platform to assist passenger when raising and lowering operations are ongoing. To be automatic folding to prevent any obstructions into the vehicle passenger area.

Door cutoff switch to prevent use of lift with doors closed.

Safety sensor switch on bridge plate to prevent use if wheelchair or person is on bridge plate.

Lift color to blend with interior colors.

The wheelchair lift shall comply with all federal and Veterans Administration regulations in effect at time of purchase.

Lift Option 2.

Suggested that at least three lift makes be called out instead of one, or approved equal.

Chassis Specifications

Chassis - Heavy-duty.

Wheelbase - 157" minimum.

Wheelbase - Overhang behind rear axle was discussed. We specify minimum wheelbase which deters long overhang, along with low bid price. The other solution would be a percentage of overhang per wheelbase used.

Engine - 350 V8, 4 barrel carburetor minimum.

Steering - Heavy-duty power with tilt steering wheel.

Axle - Front - 4,500-lb. rating
Rear - 9,800-lb. rating
GVW - 12,000-lb. rating minimum.

Differential - Truck-type rear axle. Gear ratio of 4.56:1, or as near as possible with state approval.

Battery - Two H.D. group 27, deep-cycle batteries, each with reserve capacity of 160 minutes, CCA-480 amp, 12-volt (not maintenance-free type) minimum. Two batteries to be mounted on a pull-out type tray with access door. Inside of battery compartment shall be covered with a durable insulating material to prevent electrical shorts. Battery compartment and tray shall be coated with acid resistant

Battery - Battery tray drainage must be provided.

paint. Battery shall be serviceable. Maintenance free batteries will not be acceptable. Battery compartment must be located below the floor line with adequate reinforcement brackets mounted to floor supports. Door to compartment to be lockable.	
Alternator - 130 amps., 12-volt, dual belt drive, minimum. Alternator to have external voltage regulator positioned on front side of radiator support, behind head light assy.	Alternator - Output at highway speeds may be 130 amps; but at city speeds, alternator may not putting out nearly that much. Should specify amps. vs engine rpm.
Grounds - H.D. cable adequate to handle electrical capacity of system.	Grounds - No comments.
Brakes - Power-actuated hydraulic dual system. Heaviest-duty available for stop and go operation: Front: 14.25" x 1.53" disc rotor Lining: 45 sq. in. minimum Rear: 15" x 4.0" drum or H.D. disc brakes Lining: 220 sq. in. minimum.	Brakes - No comments.
Parking Brake - Heaviest-duty available from chassis manufacturer.	Parking Brakes - No comments.
Fuel Tank - 50 gal. minimum.	Fuel Tank - Should be factory installed to meet safety requirements.
Horn - Dual.	Horn - No comments.
Shock absorbers - Heaviest-duty, front and rear, that are available from chassis manufacturer.	Shock absorbers - No comments.
Springs - Front and rear: Heavy-duty adequate to match specified GVWR.	Springs - No comments.
Stabilizer - Front: Heavy-duty.	Stabilizer - No comments.
Wheels - 19.5" x 6.75" minimum.	Wheels - No comments.
Tires - Goodyear Wrangler Radial-all season, if available, or equal, single front and dual rear. All tires to be tubeless, 8 ply (Load Range D), blackwall, 800 x 19.5, steel belted radial minimum.	Tires - Concern was expressed that on dual wheeled vehicles with all season radials the sidewalls may rub. If radials are kept properly inflated, this will not happen. Overall all season radials are the best for small transit operations.
Transmission - Heavy-duty, three-speed automatic. Cooled by an external "H.D. transmission oil cooler" in series with radiator cooler or equal. (Cooler capacity to match GVW of bus.)	Transmission - No comments.
Drive Shaft - Shall be guarded to prevent it striking the floor of the bus or the ground in the event of a tube or universal joint failure.	Drive Shaft - No comments.
Wipers - Intermittent with dual jet washers (electric or air).	Wipers - No comments.
Radiator and Cooling System - Heaviest-duty, extra cooling capacity radiator, water pump, pulley, and clutch-type fan with coolant recovery system, factory installed. Cooling system to be winterized for 40° below 0°F. Fluids to be checked and filled inside front hood.	Radiator and Cooling System - No comments.
Engine Cover - To be insulated from heat and engine road noise by 1" minimum nonabsorbent (oil or water) insulation or equal (OEM accepted).	Engine Cover - No comments.
Hood - To have lock release from inside the vehicle, easily accessible to the driver, or hood security alarm system approved by the state.	Hood - No comments.
Other Items	
Safety Warning buzzer that is readily audible outside the vehicle when transmission is in reverse. Interior warning buzzer to activate when rear door is open. A master switch with light for lift at driver station. A light at driver's station activated when lift door is open or lift is in operation.	Safety General agreements on the items listed. Some suggest that an AM radio with public address capabilities should be added. The AM radio will provide weather and emergency information. The driver may abuse its use, however. The public address system is a questionable need for small buses. It was also suggested that decals be put on the outside to indicate the location of emergency exits.

Mobile Radio - It was suggested that the specs provide for a mobile radio storage area which is enclosed and lockable, otherwise the unit will probably set on the floor behind, the driver.

Wiring

To have a master knife switch to disconnect battery from complete electrical system (easily accessible) positioned close to battery.

All cable and wiring shall be coded, and the builder shall furnish complete wiring diagram, marked to show the code used.

All wiring added to chassis fuse block to be securely fastened to prevent wires from being knocked loose by driver.

All added wiring to be H.D., grounded to body frame structure to capacity of each system, and to chassis for complete system.

All accessories and electrical equipment with the exception of head lights, tail lights, and emergency lights are to be wired through a constant solenoid energized by the vehicle's ignition switch.

To have a master switch with light to control all accessories, overriding individual switches.

All added wiring shall be installed in a split open-type loom and have a separate screw-type terminal circuit breaker system.

Wiring from chassis wiring to rear lights and gas tank to be protected and supported from ice and snow buildup. (Prefer inside bus.)

No scotch lock wire connectors allowed. Use insulated spade terminals or equal.

Wiring

Wiring is a constant problem especially the body wiring. Coded wiring and wiring diagrams are a must.

Wires run in a loom as specified will greatly reduce wiring problems.

Information to be Furnished With Each Vehicle

1. Drawings showing wiring schematics of auxiliary circuits.
2. Copy of manufacturer's statement of origin to a motor vehicle.
3. A repair and parts manual for chassis, body, and auxiliary equipment.
4. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its subsystems (i.e., wheelchair lift).
5. Detailed description and specifications of the frame structure, roof structure, side sheathing, inside panels, with particular reference to material used.
6. Operator's manual for vehicle and all add-on equipment.
7. Line setting ticket for chassis and body.
8. Warranty papers for chassis, body, and additional equipment.

Information to be Furnished With Each Vehicle

No comments.

Inspection

Vehicles shall be thoroughly inspected during construction and upon completion to ensure that all equipment is installed and operating properly. Tests shall be performed to ensure that the unit is dustproof, water-tight, fumeproof, and all vehicle fluids are per specifications.

Inspection

No comments.

Purchaser Inspection

The purchaser reserves the right and shall be at liberty to inspect all material and workmanship at all times during the progress of the work, and shall have the right to reject all material and workmanship which do not conform with the specifications, or accepted practice.

Purchaser Inspection

No comments.

Warranty

Shall be 12,000 miles, or one year on chassis and one year on body construction and add-on components. Warranty shall start the date the vehicle is placed into service from the

Warranty

It is important to note that warranty on add-on components is 12 months only and starts when the vehicle is placed in service. Everyone agreed that

purchaser. The body and all add-on components to be warranted by the body manufacturer and vendor.

add-ons require excessive maintenance and should be avoided if possible. When add-ons cannot be avoided make sure there is a minimum of 12 months warranty and a nearby service outlet.

Miscellaneous

1. Furnish state with delivery schedule of chassis to vendor.
2. Any in-line changes shall have previous written approval of the state.
3. Shall provide, on request, proof of adequate product liability insurance on bus and subsystems.

Miscellaneous

No comments.

Alternate Quotes

1. Farebox - To be modified model E-5 Diamond, SL4D Main, or equal with extra vault. Two keys per each lock.
2. Air Conditioning - Original chassis front air-conditioning system with rear auxiliary air condenser sufficient to maintain 75°F temperature at knee level throughout the interior of the bus with the outside temperature 95°F. If external, provide protective cover for condenser against foul weather. Minimum 30,000 BTU output. Rear air to be controlled by switches on driver control panel or dash panel.
3. Anti-Spin Rear Axle
4. Brake Retarder - A Telma electric brake retarder system CE30, or approved equal, shall be installed behind automatic transmission operated by the brake pedal. An on/off switch mounted in dash shall be furnished with light to indicate when energized.
5. Destination Sign - Front destination sign with movable mechanism at front end of bus over windshield. Sign curtain approximately 36" wide, model D-3110 Trans Sign, or equal. Sign curtain to be illuminated.
6. Diesel-Powered Drive Train - Diesel engine with turbo must be equipped with a dash-mounted pyrometer.
7. Tachograph - Services Recorder Co. S-70-R37386, 24-hour readout, or approved equal, including one-year supply of graphs.
8. Quick Release Double Seat - A double seat, meeting all seat specifications as in seating section of these specifications. Seat is to be in front of lift and facing aisle with quick release from flush in floor tracks that allow removal of seat without tools by Wheel Service Company, Inc., Aeroquip, or equal. This configuration to meet FMVSS222 school bus seating and crash protection standards.
9. Emergency Exit - Provide an emergency exit window in rear of bus (in lieu of rear exit door) with fastening device for opening from inside which may be quickly released but designed to offer protection against accidental release. Label inside rear window with opening instructions.
10. Propane Fuel - Provide propane conversion unit with Impco or equal propane carburetor equipment, carburetor adapter, vaporizer adapter, hoses and fittings, vent kit, fill door, recurve distributor, propane fuel tank etc., to complete conversion. Fuel tank working capacity to match regular fuel tank capacity in spec. Fill is to be through access door in lower side of body. Lift-equipped buses not to have fuel tank on same side as lift.

Alternate Quotes

Farebox - The fareboxes listed have a larger capacity.

Air Conditioning - Rear air conditioning add on units are necessary to properly cool the vehicle. The initial cost of air conditioning plus maintenance costs vs comfort must be evaluated. In northern Michigan several systems do without air conditions.

Anti-Spin Rear Axle - No comments.

Brake Retarder - Brake retarders on the market are too large and too expensive for small buses. At present unit prices of $2,500 to $3,000 this item is questionable.

Destination Sign - No comments.

Diesel-Powered Drive Train - No comments.

Tachograph - No comments.

Quick Release Double Seat - No comments.

Emergency Exit - No comments.

Propane Fuel - No comments.

Bidder to Supply With Bid Quotation

1. Detailed floor plan with dimensions showing interior layout of vehicle including seat and stanchion locations.
2. Specifications for wheelchair lift and wheelchair restraints.

Bidder To Supply With Bid Quotation

No comments.

3. Design of entrance door and door opening device.

4. Design of entrance step configuration.

5. Chassis specifications.

6. Period of time from date of bid opening that prices will remain firm should customer desire to order additional units.

7. Delivery time from receipt of chassis.

8. Warranties.

9. List of exceptions to specifications.

10. Copy of FMVSS220 test results.

11. Parts list with up-to-date prices for body and subsystems.

SECTION 14

TECHNICAL ASSISTANCE ROLES: SUMMARY OF PANEL MEETING DISCUSSIONS

Moderator:

Joseph Daversa
Pennsylvania DOT

Panelists:

Michael R. Noel, Cambria County Transit Authority
Patrick B. Simmons, North Carolina DOT
Gary Teachworth, Michigan DOT
W. David Wood, Ohio DOT

TECHNICAL ASSISTANCE ROLES: SUMMARY OF PANEL MEETING DISCUSSIONS

Joseph Daversa
Pennsylvania DOT

This panel meeting report includes a brief review of a recent Pennsylvania Department of Transportation (Penn DOT) technical assistance program which was presented by the Moderator during the general session, and was discussed further in the panel session.

Pennsylvania Conference

The recent Pennsylvania DOT technical assistance activities resulted from a survey of rural operators conducted by the Pennsylvania Association of Municipal Transit Authorities. Operators were asked what the State could do to be of most help. The responses in order of priority were:

- Assistance with local match requirements
- Assistance with vehicle procurements
- Development of specifications

The priority problems included both legal and technical issues. To address these problems the State DOT met with rural operators to plan a conference which could best meet their needs within a short time-frame. The State of Pennsylvania has 40 rural counties and 20 rural transit systems with extremely diverse types of service; ranging from fixed-route full sized bus to taxi-type operations. Because of the particular needs of these operators the conference included some subjects which might not be as necessary in other states. However, the conference as convened in Greenberg, PA included:

- A major emphasis on vehicles with opportunities for operators to ride a variety of candidate vehicles.
- Detailed specifications provided in advance by manufacturers.
- Engineering and mechanical examination of vehicles on lifts and in operation - grouped by vehicle type.
- Comments by experienced mechanics and engineers from both manufacturers and operators.

The conference was extremely well-received. It gave operators the benefit of first-hand exposure to characteristics buyers should be aware of when conducting a procurement. The vehicle inspections were not a fault-finding session, but emphasized good points as well as potential sources of problems.

The Greenberg conference illustrates what appears to be one natural separation of local and Federal roles in technical assistance. Some activities, such as the maintenance data base developed by Arthur D. Little, Inc., cannot be accomplished effectively by individual States because it would result in much duplication of effort. On the other hand, a large national conference could not provide the degree of learning and interchange which can be obtained within a State by a smaller group meetings and direct hands-on experience.

Panel Discussions - Technical Assistance with Procurement

A review of State DOT technical assistance by panelists showed considerable variation in the depth of State DOT involvement in procurement of small vehicles. Generally, there is a much deeper involvement in vehicles purchased with Section 16 (b)(2) funding assistance. (See Section 9, "Selecting a Vehicle", Table 1 - Approaches To Vehicle Selection).*

Panelists agreed that there are a number of outright advantages to having the State DOT do the total procurement job. These include: lower cost per vehicle, less duplication of effort, more thorough specifications and inspections, and usually a better quality vehicle. However, State regulations may not permit this approach, or if they do, they may require purchasing by another agency such as a State GSA. This can be a help where the other agency has technical expertise (such as communications equipment), but it can also add to coordination and approval requirements.

The process also requires the State to assume responsibility for assuring sufficient involvement with operators in developing specifications, evaluating purchases, and updating the procurement package. Most States which prepare specifications or specification guides hold annual or semi-annual review meetings and many sponsor (or co-sponsor with an association) workshops and vehicle fairs.

Technical Assistance by the Ohio DOT has focused on its Vehicle Catalog * and Specifications for Elderly and Handicapped Passenger Transportation Vehicles. These are updated annually in line with the grant cycle. For Section 16(b)(2) purchases, the catalog specifications are legally advisory, but in practice are used to select vehicles for procurement by the State DOT. For Section 18 purchases, the documents are used as guidelines. Creation and maintenance of these types of documents imposes a considerable workload on the State.

Michigan DOT has found that site inspections of manufacturers' plants have been particularly effective in improving the procurement process. Pre-bid inspections include review of engineering, management, and quality control functions. After the inspections, manufacturers are in a better position to decide whether or not to bid on a particular procurement. Because of its consolidated buys, the Michigan DOT is also able to do more in process inspection than a single agency could afford. These include a pilot model inspection, mid-production inspection, and acceptance inspection.

After reviewing each State's experience, panelists had a number of observations and recommendations for the general session. These included:

- Vehicle replacement criteria are badly needed both locally and nationally. Operators should consider the long range needs and compositions of their fleets (10-12 years). The long-range program

*The 1983 Ohio Catalog has been reprinted by the U.S. Department of Transportation, Technology Sharing Program (I-30E), Office of the Secretary, Washington, DC 20590. A copy of the catalog is available to State and local officials by sending a self-addressed mailing label to that office.

should be a stronger factor in making current equipment selections. North Carolina requires operators to submit a five-year plan and recommends this as a minimum.

- o No two States appear to classify vehicles in the same way or have specifications which cover identical sets of manufacturers' products. Classification can have a strong effect on vehicle selections. Although total uniformity is not necessarily desirable, a more common vocabulary would be helpful in communicating with manufacturers and operators, and between States.

- o Strong statewide associations of transit authorities are a valuable asset both to the State DOT and the authorities themselves. They can organize purchasing pools, workshops, training programs and other means for technical interchange in a manner that is often quicker and more responsive than that of government organizations. They also help work toward standardization of vehicles.

- o Whether used for life cycle procurement selections, or as a cost control measure, the buyers and users of small vehicles could benefit from an objective evaluation of extended warranties (Michigan has recently purchased five contracts for evaluation.) The question of how much warranty (if any) would be considered a capital cost for UMTA funding may need to be resolved. UMTA general policy is not to fund as capital any costs greater than "industry-standards."

- o Factory inspection and acceptance are a special problem for small operators. One solution could be to include the buyers' travel costs in the purchase order as part of the vehicle cost. Another is to have the State provide experts or contract for support from one of the large operators. Operators could consider sending a mechanic to perform the acceptance inspection and then delivering the vehicle-thus saving some delivery costs.

Panel Discussion - Other Technical Assistance

Training programs, newsletters, and workshops of various kinds have been used by most State DOTs participating in this discussion group. The group consensus was that much more needs to be done in the area of vehicle maintenance and that quite a bit of duplication could be going on in the development of training programs.

The Michigan DOT program in small vehicle maintenance is cited as being perhaps the longest established program and one with the most experience. Michigan has used a maintenance handbook since 1980 and operates a statewide data base containing voluntary maintenance reports from operators. It produces a monthly vehicle maintenance cost report from the data and releases trouble-shooting bulletins as appropriate. Another successful activity is a 2 1/2 - day Summer Maintenance Seminar at the State Conference Center. The fees are minimal and the program features extensive hands-on activities, ranging from vehicle testing to unit overhauls. The Michigan DOT is currently encouraging agencies which have enough vehicles (15-25) to employ a mechanic and conduct their own preventive maintenance program. They have found that dealers do not do as good a job.

Michigan DOT has recently completed a new small bus training program which includes an operator's manual and course curriculum. The course includes films, lectures, exercises, written tests, and road tests. A limited number of copies of the Syllabus and Operator's Manual can be made available to other States. The contact is Kip Grimes (see Appendix E, List of Participants).

State and Federal Roles

The consensus of this session was that for most forms of direct technical assistance to social service operators and small transit authorities, State DOTs were in the best position to maintain contact and be responsive to local needs. Assistance from UMTA is needed by the States, however, in a number of areas:

- Collection and dissemination of data on specific vehicles
- Conferences such as this one in which experience and ideas may be interchanged among technical assistance providers, researchers, manufacturers and operators
- Support for more coordination and communication among States.

Provision of technical assistance by State DOTs is working successfully for the States which have fairly large programs. In these States it is not necessary and would not be cost effective for UMTA to attempt to conduct workshops and training programs for operators. However, session participants agreed that a special problem exists with States which have smaller programs. It was suggested that UMTA Regions or subgroups of State DOTs could possibly be organized to develop and provide technical assistance over broader geographic areas. In any case, shortages of funds, staff, and technical resources are a very real problem for many States. By way of illustration panelists pointed out that most of the attendees at this workshop in Indianapolis were from states which had large programs.

In conclusion, participants in this panel discussion concurred that another new association or organization was not needed to coordinate technical assistance among states or provide input to UMTA. The American Association of State Highway and Transportation Officials (AASHTO) provides an appropriate forum that can be used along with other existing communication networks to provide nationwide coverage.

APPENDIX A

OHIO DOT CONVERTED VAN SPECIFICATION

APPENDIX A

OHIO DOT CONVERTED VAN SPECIFICATION

Specifications produced by the Ohio Department of Transportation (Division of Public Transportation) were used as model documents for the session on Specifications for Standard and Converted Vans. These, as well as other ODOT vehicle specifications, were distributed to all session attendees:

A. Van A Specifications.
Basic Specifications for Type "VA" Vehicles:
Van, Model A. Standard Van.

B Van B Specifications.
Basic Specifications for Type "VB" Vehicles:
Van, Model B. Standard Van with Ramp.

This vehicle is a standard, large (nominal 15 passengers) van which is equipped with a rear-mounted wheelchair ramp. Space is provided in the rear of the van for one wheelchair passenger. This van is intended for use by agencies who want the ability to transport wheelchair passengers but who would expect that only infrequent use of the van would be made by passengers in wheelchairs.

C. Van C Specifications.
Basic Specifications for Type "VC" Vehicles:
Van, Model C. Converted Vans.

This vehicle is a large (15 passenger size) van which has been modified or converted by the addition of a raised roof and a passenger service entry door. The vehicle may be equipped with a wheelchair lift to serve handicapped passengers.

In the interest of brevity, only the specification for converted vans (Van C Specifications)is included in this Appendix.

Ohio Department of Transportation
Bureau of Public Transportation

Section IV C

BASIC SPECIFICATIONS FOR TYPE "VC" VEHICLES: VAN, MODEL C

CONVERTED VANS

(January 1983)

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BASIC SPECIFICATIONS FOR TYPE "VC" VEHICLES: VAN, MODEL C

(A) GENERAL: This item shall be a passenger transportation vehicle consisting of a large van which has been modified or converted to provide additional interior headroom and clearances and improved passenger accessibility. It is the responsibility of the vendor to supply the basic van and to convert or modify it in accordance with these specifications. A wheelchair lift may be required on the vehicle. The conversion or modification of the basic van shall consist of the following:

(1) Removal of the standard factory-production van roof, any necessary reinforcement of the body frame, and installation of an extended roof.

(2) Installation of a front service entrance in the vehicle, with extended door height, steps, and any necessary reinforcement of the body frame.

(3) Installation of insulation, floor covering, interior fixtures, finishings, and seating.

(4) If a wheelchair lift is required, installation of the lift, wheelchair occupant restraint systems and wheelchair securement system, as well as extended door height at wheelchair lift access doors.

(5) Other modifications called for in these specifications, as well as any and all modifications required to provide a complete functioning vehicle.

The successful vendor shall provide a complete operating vehicle and the vehicle shall, at a minimum, conform in strength, quality of material and workmanship to what is provided by the automotive industry generally. The vehicle to be provided shall be the latest current model vehicle, incorporating the latest engineering changes. All parts necessary to provide a complete passenger transportation vehicle shall be provided and all parts shall be new.

The bidder shall describe the vehicle and equipment he proposes to furnish as part of his bid.

The vehicle shall conform in all respects to the applicable Motor Vehicle Laws of the State of Ohio. The vehicle shall also, at a minimum, conform to all applicable Federal Motor Vehicle Safety Standards.

Any delivered vehicle not conforming to these specifications can be rejected.

(B) BASIC VAN:

(1) DESCRIPTION: The vehicle shall be equipped with all of the van manufacturer's standard equipment (or the van manufacturer's better optional equipment), unless otherwise specified. The basic van which the successful vendor supplies shall be one of the following:

(a) Dodge Ram Maxiwagon, model B350, 127.6 inch wheelbase.

(b) Plymouth Voyager Maxiwagon, model PB350, 127.6 inch wheelbase.

(c) Ford Super Wagon, E-350 series, 138 inch wheelbase.

The basic van shall be provided with the following equipment which shall be factory-installed by the van manufacturer:

(a) Minimum G.V.W.R. (Gross Vehicle Weight Rating) of 8500 pounds.

(b) Eight-cylinder gasoline engine with a minimum displacement of 5.74 liters (350 cubic inches).

(c) Automatic transmission.

(d) Power brakes.

(e) Power steering.

(f) Increased, extra or heavy-duty cooling.

(g) Transmission oil cooler.

(h) Total battery capacity of at least 500 cca (cranking performance amperes @ 0°F).

(i) Alternator with minimum capacity of 100 amps.

(j) Total fuel tank capacity of at least 33 U.S. gallons.

(k) Oil pressure gauge, temperature gauge, and ammeter or voltmeter.

(l) Inside hood release.

(m) Dual electric horns.

(n) Dual outside mirrors of western-style type or below-eyeline low-mount type, each at least 6 inches by at least 9 inches in size. Each mirror shall have a 3 inch diameter

circular stick-on convex spot mirror mounted at the bottom center to widen the rear view field of vision.

(o) Windows in all doors.

(p) Tinted glass in windshield and all windows.

(q) High-output front heater and auxiliary heater in passenger compartment.

(r) Front and rear bumpers.

(2) SUSPENSION SYSTEM: Heavy-duty (heaviest available for van usage) shock absorbers shall be installed on both the front and rear of the chassis. Heavy-duty springs shall be installed front and rear which are of sufficient strength to carry without damage their share of the actual weight of the vehicle plus anticipated loads and stresses.

If a wheelchair lift is installed on the right side as per Section (H)(3), the suspension shall be strengthened on the right side to prevent any listing or leaning to that side.

(3) DRIVE SHAFT GUARD: Each drive shaft shall be equipped with adequate protective metal guard or guards to prevent whipping through floor or dropping to ground if broken.

(4) UNDERCOATING: The entire underside of the vehicle body including undersides of fenders shall be coated with fire-resistant asphalt base, rubber base or equivalent undercoating material applied by spray method in order to seal, deaden sound, insulate and prevent oxidation.

(C) BODY CONSTRUCTION:

(1) GENERAL: The vehicle shall be reinforced such that the structural integrity of the basic van is not degraded. The body including the roof shall be of sufficient strength to support the entire weight of the fully-loaded vehicle on its top or side, if overturned.

The extended roof shall be of the arch-like type constructed of steel or fiberglass. Steel cross bows shall be provided to support the roof. Roof construction shall be of sufficient strength and stiffness to prevent vibration, drumming, or flexing in service. The extended roof shall be joined to the vehicle by means of welding, riveting or bolting. Roof construction shall be such that there will be no separation at any joints between the extended roof and the basic van body.

A full length roof liner, which gives a uniform interior ceiling surface, shall be provided of molded fiberglass, vinyl-clad metal sheeting or painted metal sheeting. Interior sides below and between windows shall be covered with a uniform appearing scuff-resistant material.

All exterior joints and seams shall be protected by the application of caulking compound. The body shall be sealed and made tight to prevent entrance of dust or moisture into passenger and driver compartments.

At locations where steps are installed or door heights extended on the basic van, the door opening shall be reinforced such that the structural integrity of the vehicle is maintained. All interior steps shall be constructed of metal adequately braced to prevent deflection and shall be an integral part of the vehicle structure.

(2) WINDOWS: Standard windows in doors and the windshield in the basic van shall be retained.

At least one side standee window shall be furnished in the extended roof. All windows in the extended roof shall be of the fixed, tinted, safety glass type.

The vehicle either shall include the basic van manufacturer's full window treatment with all factory-available side windows or shall have windows of the horizontal slide-opening type installed in the body side throughout the passenger compartment. All windows of the horizontal slide-opening type shall have sashes of the double bay, horizontal slide type equipped with adequate locking features and devices to prevent window sections from moving or sliding by themselves during vehicle stops and starts. Additionally, all windows of the horizontal slide-opening type shall be glazed with tinted safety glass.

(3) FLOOR: Waterproof, fire-retardant plywood not less than one-half (0.5) inch thick shall be attached to the metal floor of the basic van.

Wall-to-wall hard fire-resistant rubber floor covering shall be securely bonded to the plywood floor with adhesive of waterproof type. All edges of the rubber floor covering shall be properly sealed and there shall be no bubbles or blisters in the floor covering. The rubber floor covering shall be at least one-eighth (0.125) inch thick with smooth surface under seats and in driver's compartment. The rubber floor covering shall be at least three-sixteenths (0.187) inch thick with ribbed surface in aisle and entranceway. Thickness shall be measured from top of ribs of floor covering. Metal stripping or molding shall cover all floor covering joints between the ribbed center aisle and the smooth under-seat floor covering. Moldings shall also be provided at the junction of the floor covering with side wall panels and wheel housings; and shall be firmly attached to the floor and conform closely to the floor, sidewalls and wheel housings.

All portions of the floor covering shall be of the same material (differing only in whether or not it is ribbed and its thickness) and color.

(4) INSULATION: The vehicle body shall be fully insulated in the roof and all body panels to deaden sound, and reduce vibrations and heat transfers.

A minimum one and one-half (1.5) inch thick blanket of fiberglass or other fire-resistant insulation material shall be provided in sidewalls.

The roof of the vehicle shall be fully insulated with fiberglass or other fire-resistant insulation material to a minimum average thickness of one-half (0.5) inch.

(5) DOORS AND STEPS:

(a) FRONT SERVICE ENTRANCE: A front service entrance shall be provided on the right side (i.e., curb side) of the vehicle directly opposite the driver's seat. The front service entrance shall be provided by modifying the doorway on the basic van at this location. The front service door shall provide a clear entry height of at least 75 inches and a clear entry width of at least 16 inches.

The front service door shall be mechanically opened and closed by means of a driver-actuated manually-operated door control. The door control shall consist of a handle and bar assembly which can be easily operated by the driver from the driver's seat.

The front service entrance shall have at least two interior steps below floor level. No outside steps shall be provided. Each step shall be at least 16 inches wide and have at least a 9 inch tread depth. All risers shall be approximately the same height and not exceed 9 inches. The first step height from street level shall not be more than 12 inches.

The tread surfaces of the front service entrance steps shall be covered with hard fire-resistant rubber covering. The rubber covering on tread surfaces shall be at least three-sixteenths (0.187) inch thick with ribbed surface. Thickness shall be measured from top of ribs of floor covering. The rubber covering shall be permanently bonded to the metal step surfaces and shall be properly sealed to prevent moisture from getting underneath with all necessary moldings provided. Step edges shall be marked in white, yellow or orange.

The outer edge of the front service door shall be weatherstripped, as necessary, to provide a watertight seal. Suitable padding, to protect the heads of boarding or exiting passengers, shall be installed on the inside of the vehicle on the lintel of the front service entrance doorway.

(b) DRIVER'S DOOR: No modifications are required on the basic van's driver door. Pads or strips of skid-resistant material shall be installed in the step sill at the driver's door.

(c) REAR AND SIDE DOORS: The basic van's rear and side doors shall be retained if no wheelchair lift is required on the vehicle; and shall be openable from the inside. If a lift is required, see Item (H) for treatment of these doors.

(d) WHEELCHAIR ACCESS DOORS: If a wheelchair lift is required on this vehicle, wheelchair access doors shall be provided as specified in Item (H).

(6) ELECTRICAL REQUIREMENTS:

(a) WIRING: All wiring added during the modification or conversion of the basic van shall be color coded or number coded. All wiring shall be properly insulated and, as necessary, shall be held in place with clamps. There shall be no exposed or loose wiring in the driver or passenger compartment of the vehicle.

(b) LIGHTING: The interior of the vehicle shall be adequately illuminated, and overhead lighting fixtures shall be arranged in such a manner that adequate lighting is provided at the reading plane of the passengers. The front service entrance stepwell shall be illuminated by a stepwell light. The stepwell light shall be positioned so that the stepwell and a portion of the ground area immediately outside of the vehicle are sufficiently illuminated. These interior lighting fixtures shall be operable with or without the engine running.

If a lift is required on the vehicle, a light shall be installed inside the vehicle above the wheelchair lift.

(D) PAINTING:

(1) GENERAL: All exposed metal surfaces, excepting aluminum and stainless steel, must be painted, chromed or galvanized.

(2) EXTERIOR PAINT: All painted exterior surfaces shall match the exterior paint color of the basic van. The exterior paint scheme is to be a solid color paint scheme in one of the van manufacturer's standard paint colors. If the extended roof is constructed of fiberglass its color may be white, off-white, cream, or a prior approved acceptable pastel shade; or it may be painted to match the body of the van.

The exterior color which it to be provided on an individual vehicle will be stated on the purchase order submitted to the successful vendor. The bidder shall submit the available standard paint colors as an addendum to his bid.

(3) INTERIOR PAINT: All interior surfaces which require painting shall be painted the same color. This includes the exposed interior metal surfaces, if any, of the side and rear doors. The interior color shall be color-keyed to the van's exterior color and shall harmonize with the color of the roof liner and any side panelling or other covering.

(E) TIRES AND WHEELS: The size of tires shall be a minimum of 8.00 x 16.5 and tires shall have at least an eight ply rating. A spare tire and wheel shall be provided. All tires and wheels shall be of the same type and shall be interchangeable. Tires and wheels shall be properly balanced and aligned.

The spare tire and wheel shall be mounted on the outside of the rear door. The mounting device shall be such that the wheel may be locked in place with a padlock or a keyed locking device.

(F) EMERGENCY EQUIPMENT: The following equipment shall be provided on the vehicle:

(1) WARNING DEVICES: Six (6) 30-minute road flares and three portable warning reflectors mounted on stands shall be furnished.

(2) FIRE EXTINGUISHER: One dry chemical fire extinguisher of at least five (5) pound capacity shall be furnished and shall be bracket mounted and easily accessible to the driver.

(3) FIRST AID KIT: A first aid kit with a minimum of ten (10) different units (each unit shall be of a different type from every other unit) shall be furnished and mounted in a location easily accessible to the driver.

(4) LUG WRENCH: A lug wrench of the proper size and type to remove wheels from the van shall be furnished.

(5) JACK: A jack of sufficient strength to safely lift the vehicle for tire changing shall be furnished.

The mounted location of any of the above equipment shall not interfere with passengers' limbs or placement of feet or interfere with movement of passengers and/or wheelchairs within the vehicle. Also, none of the equipment shall be mounted on a door.

(G) INTERIOR:

(1) AISLE: The aisle will provide a clear passageway not less than 12 inches wide from the front service door to the back of the passenger compartment.

(2) HEADROOM: The inside body height of the vehicle from surface of floor covering to ceiling as measured at any point along the longitudinal center line of passenger aisleway shall not be less than 72 inches. If an air conditioning unit is provided,

the minimum inside height may be less than 72", as necessary for installation of the rear air conditioning unit, at the extreme rear of the vehicle only.

(3) SEATING:

(a) DRIVER'S SEAT: The driver's seat shall be the fully padded, deluxe, contoured bucket type of heavy-duty construction. The driver's seat shall be easily adjusted forward and backward without the use of tools.

(b) PASSENGER SEATS: All regular passenger seats shall be forward-facing, aisle-facing or a combination thereof. Passenger seats shall be securely fastened to parts of vehicle that support them, but all passenger seats must be removable. All passenger seats and supporting frames shall be of heavy-duty construction. Seat padding and covering shall be fire-resistant. Passenger seats shall be fully padded and shall be covered with commercial grade vinyl with a minimum weight of 36 ounces per square yard.

Passenger seat depth shall be at least 15 inches. Passenger seats intended to seat two or more passengers abreast shall provide a minimum of 17 inches per passenger. Single passenger seats shall be a minimum of 18 inches wide. The top of the seat back cushion at each passenger seat shall be between 32 inches and 38 inches above the floor.

Armrests shall be provided on both sides of all aisle facing seats and on the aisle side of all forward facing passenger seats. No more than two passenger positions shall be placed abreast without an armrest between adjacent positions. All armrests shall extend to within two inches, or less, of the front edge of the seat, but not beyond the front edge. Jump seats are exempted from armrest requirements.

(c) SEAT BELTS: A seat belt shall be provided at the driver's seat and at each passenger seating position.

(4) WHEELCHAIR POSITIONS: Wheelchair positions are spaces inside the vehicle for transporting persons in wheelchairs which are to be provided on vehicles having wheelchair lifts. Each wheelchair position shall consist of a usable floor area in which a passenger in a wheelchair may be positioned and in which a wheelchair occupant restraint system and wheelchair securement devices are to be installed. All wheelchair positions shall be designed to secure wheelchairs in a side-facing or forward-facing position.

Wheelchair positions which are located side-by-side with no obstruction between them shall be at least 27 inches wide and 50 inches deep. In all other cases each wheelchair position shall

be at least 28 inches wide and 50 inches deep, except where two or more wheelchair positions are placed in file the second position, and all following positions in the same file, may have a minimum depth of 47 inches.

(5) FLOOR PLAN: Passenger seats shall be arranged such that the unobstructed hip-to-knee room as measured at seat level which is provided for each seated passenger shall not be less than 25.5 inches.

In determining locations of wheelchair positions, special attention should be paid to maintaining adequate aisle and passage widths within the vehicle. There shall be an unobstructed passageway at least 28 inches wide for the passage of wheelchairs from the lift to all wheelchair positions, measured before any wheelchairs are aboard the vehicle.

If a wheelchair position (WCP) is located between the rear wheelwalls, the WCP shall be placed (as close as practical) adjacent to the left rear wheelwell cover.

See Item (H) for additional floor plan requirements.

(6) STANCHIONS, GRAB RAILS AND BARRIER PANELS: An overhead ceiling-mounted grab rail, placed over one side of the aisle, shall be provided for the full length of the vehicle's passenger aisleway. A grab rail shall be provided at the front service entrance doorway. Grab rails shall be of minimum one (1) inch outside diameter stainless steel tubing.

One vertical stanchion shall be mounted at the rear of the driver's seat next to the aisle. Another vertical stanchion as well as a barrier panel shall be installed at the rear of the front service entrance stepwell. There shall be a vertical stanchion at the rear of the location of a side mounted wheelchair lift.

All vertical stanchions shall extend from floor to ceiling or from floor to overhead grab rails. Stanchions shall be of minimum one and one-fourth (1.25) inches outside diameter stainless steel tubing and shall be padded.

Barrier panels shall be adequately reinforced and shall be padded on any side facing passenger seating positions.

(7) OTHER: The interior of the vehicle shall be free of all projections. All sharp edges, protruding fasteners and brackets that could cause injury to passengers or catch hold of clothing shall be covered. The interior of the vehicle shall be completely finished, and insulated sidewalls shall be covered with paneling.

(H) CAPACITY LIFT LOCATION AND FLOOR PLAN OPTIONS:

(1) GENERAL: On those vehicles requiring a wheelchair lift (WCL), the WCL shall be installed on the converted van in either a "side of van" or "rear of van" location (locations are indicated by VCS and VCR, respectively, in floor plan alphameric designation). A converted van without a WCL is designated as a "VC". Placement of passenger seats and wheelchair position (WCP), or positions, will be determined by WCL location, if a WCL is required. Each item in the "Invitation for Bids" will indicate which WCL location is required for that vehicle(s) and which floor option is to be provided.

(2) CAPACITY: Each floor plan option shall offer floor plans with the capacity and equipment indicated in the following table:

CAPACITY TABLE

Vehicle Designation	Minimum Total Passenger Capacity*	Min. Adult Passenger Seating Capacity**	Lift Location	Number of Wheelchair Positions	No. of Jump Seat Positions*** Floor Plan Option	
					#1	#2
VC-13-0	13	13	None	0	0	0
VCS-10-1	11	10	Side	1	1	1
VCS-8-2	10	8	Side	2	2	2
VCS-6-3	9	6	Side	3	4	3
VCR-10-1	11	10	Rear	1	1	1
VCR-8-2	10	8	Rear	2	1	3
VCR-6-3	9	6	Rear	3	3	4

*Passenger capacity does not include driver or standees, but does include number of regular passenger seats and number of wheelchair occupants for which space is provided.

**Jump seats not included.

***Number of jump seat positions to be provided, if jump seat option is required.

(3) SIDE OF VAN WHEELCHAIR LIFT LOCATION (OPTION): Under this option the WCL shall be installed in a wheelchair access doorway located at the dual hinged doors on the right side of the basic van (which would otherwise provide access to the van's

passenger compartment). The wheelchair access doorway, and the doors, shall be extended to provide a clear door opening of at least 57.5 inches measured from the top of the doorway opening to the floor level. The wheelchair access doors and entryway shall be made suitable for the installation and operation of the wheelchair lift in this location.

Suitable padding, to protect the heads of wheelchair occupants, shall be installed on the inside of the van on the lintel of the doorway or on the WCL's crossarm, whichever is lower.

The outer edges of the wheelchair access doors shall be weather-stripped, as necessary, to provide a watertight seal. Also, provisions shall be made for fastening the access doors in the fully-open position, when the WCL is in use.

For this option, the van's basic rear door(s) shall be maintained and shall be openable from both the inside and outside of the vehicle.

(4) REAR OF VAN WHEELCHAIR LIFT LOCATION (OPTION): Under this option the WCL shall be installed in a wheelchair access doorway located at the dual hinged rear doors (extreme rear, or back-end, of the vehicle) of the basic van. Dual hinged rear doors shall be provided on the basic van. The wheelchair access doorway, and the doors, shall be extended as required to provide a clear door opening of at least 57.5 inches measured from the top of the doorway opening to the floor level. The wheelchair access doors and entryway shall be made suitable for the installation and operation of the wheelchair lift in this location.

Suitable padding, to protect the heads of wheelchair occupants, shall be installed on the inside of the van on the lintel of the doorway or on WCL's crossarm, whichever is lower.

The outer edges of the wheelchair access doors shall be weather-stripped, as necessary, to provide a watertight seal. Also, provisions shall be made for fastening the access doors in the fully-open position, when the WCL is in use. If the factory installed door-checks will not adequately secure the doors, due to wind loads or the stress caused by the weight of the spare tire on the door, then additional door-checks or braces shall be installed. With this WCL location option, the spare tire (see Item E) shall be located on outside of the rear door leaf opposite the WCL controls.

For this option, the van's basic side door(s) shall be maintained and shall be openable from both the inside and outside of the vehicle. Also, the vehicle's plywood floor and floor covering (see Item C-3) shall be extended on the right side to span the built-in van step at the side door(s). The floor extension shall be extended to the closed side door(s) and the exposed edges of the plywood and floor covering shall be covered

with an edge molding. Additionally, the extended portion shall be properly braced underneath to prevent deflection or fracture of the cantilevered floor.

(5) FLOOR PLAN OPTIONS: Two floor plan options shall be offered for each of the vehicles designated in Item (H)(2), as follows:

(a) OPTION #1: This option shall offer the required number of regular passenger seats (i.e., 13, 10, 8 or 6) with the majority of the seats in a forward facing position.

(b) OPTION #2: This option shall offer the required number of regular passenger seats (i.e., 13, 10, 8 or 6) with all the seats in a perimeter position.

(c) EXAMPLE FLOOR PLANS: Examples of acceptable floor plans for each vehicle have been included at the end of the text. In each case, option #1 is a primarily forward facing seating arrangement and option #2 is a perimeter seating arrangement. Other seating arrangements submitted by the bidder may be approved if all specifications are met.

If jump seats are required, they shall be located where and as shown on the floor plan example for the option chosen.

(d) SUBMISSION OF FLOOR PLAN DRAWINGS: The bidder shall prepare a detailed interior floor plan for each vehicle type and seating configuration to be provided. The interior floor plan shall show the locations of all passenger seats, all wheelchair positions and securement system locations, the wheelchair lift and the rear wheel housings, with dimensions indicated throughout. The bidder shall submit the proposed interior floor plans as an addendum to his bid.

(I) WHEELCHAIR LIFT SYSTEM:

(1) GENERAL: The wheelchair lift system shall be a system which permits persons confined to a wheelchair to enter and leave a vehicle while in a wheelchair without difficulty by means of a vertical lifting platform or lift and which also provides for the safe transportation of persons in wheelchairs inside the vehicle. The components of the wheelchair lift system shall include the following:

(1) lift,
(2) wheelchair securement system,
(3) wheelchair occupant restraint system, and
(4) any and all modifications required to the exterior and interior of the vehicle to provide a complete, functioning system.

All parts shall be new. All necessary servicing and adjustments shall be made on the equipment prior to delivery of the vehicle.

All equipment shall be ready for immediate and continuous operation upon delivery of the vehicle. All exposed metal surfaces shall be painted or shall be corrosion-resistant. All lift components (including wiring) located on the underside of the vehicle shall be concealed but accessible for maintenance purposes. All interior wiring shall be concealed.

(2) LIFT: The lift shall be installed on the right (curb) side or on the rear end of the vehicle according to the lift location option chosen and as specified in Item (H). The lift shall include a platform upon which a person in a wheelchair may be raised and lowered between the floor level of the vehicle and the ground. The platform shall be capable of safely supporting a 1,000 pound load, and the lift shall be capable of smoothly raising and lowering on the platform any load between zero (0) pounds and 700 pounds. The time required to lower the platform from the vehicle floor level to ground level with a full load shall not be substantially different than the time required for the same operation with no load.

The lift shall be either electro-mechanically or electro-hydraulically powered. The lift may be of the automatic or semi-automatic type. The raising of the platform shall be power operated, however, the lowering of the platform may be either power operated or "gravity down". A pressure bypass or automatic off switch shall be activated at the extremity of the raising operation for all lifts, and at the extremity of the lowering operation for power-operated lowering of the platform, to eliminate the possibility of the operation remaining engaged after reaching the end of usable travel. In the event of power failure, the lift shall be manually operable through the entire cycle of operations. The manual operation of the lift during power failure shall be by means of either a hand crank or hand-operated air pump, although the movement of the lift platform from its resting or stowed position to its operating position may be a manual operation in this case.

The lift shall be constructed in such a manner that all areas on or adjacent to the platform are smooth surfaces in order to prevent injury to persons on the lift platform. Under-floor areas shall be shielded from the lift platform to prevent injuries to limbs during operation of the lift.

The controls for operation of the lift shall be designed for both portable and stationary operation. The control unit shall be supplied with control cable of sufficient length to allow the lift operator to ride on the lift platform through all operations with a passenger in a wheelchair. A method of hanging the control unit, when not in use, out of the way of the lowered platform shall be provided. The hanger provision shall be easily reached by the lift attendant while standing at ground level. Control switches may be either toggle, rocker or push-button type and shall be spring loaded to automatically return to the off position when pressure is released.

The lift shall be installed at the wheelchair access doorway. All components of the lift mechanism shall be located inside the vehicle or shall retract inside the vehicle.

The lift platform shall have a usable clear area at least 40 inches long and at least 29 inches wide. The platform surface shall be either of non-skid material or expandable metal. Any action required to move the lift platform from the resting or stowed position to the operating or lifting position and then back to the resting or stowed position shall be accomplished with the same type of power unit and controls that provide for movement of the platform. In order to reduce the possibility of the lift platform being retracted while in use, an interlock shall be provided which prevents the platform from being retracted or moved from horizontal unless the platform is at the vehicle floor level or maximum height to which it can be raised.

The lift platform shall be secure and stationary when the platform is in the resting or stowed position.

The lift platform at the floor edge shall be in a color contrasting with the vehicle floor covering, or white, yellow or orange striping shall be provided on the vehicle floor edge at the lift platform.

A protective flange shall be provided on both sides of the lift platform to prevent a wheelchair from rolling off either side of the platform.

A protective hinged flipper-type panel or bar shall be provided across the outward-facing edge of the platform to prevent a wheelchair from rolling off the edge of the platform when it is above ground level.

A handrail shall be provided on one side of the lift platform for use by a wheelchair occupant or attendant while on the platform. The handrail shall raise automatically when the lift platform is moved to the operating or lifting position and shall fold down automatically when the lift platform is moved to the resting or stowed position.

The bidder shall submit as an addendum to his bid detailed drawings of wheelchair lift mechanisms with dimensions indicated and also drawings or photographs of the operation of the lift.

(3) WHEELCHAIR SECUREMENT SYSTEM: At each required wheelchair position a wheelchair securement system shall be provided to securely hold the wheelchair in the wheelchair position. This system shall be composed of a complete belt-track system (Aeroquip Corporation Wheelchair Securement System or approved equal) or a combination of a belt-track system and wheelchair locks, as described below:

(a) System A. This system shall be composed of the following elements. At each wheelchair position (WCP) wheelchair wheel locks shall be installed to secure the rear wheels and a two point belt-track attachment system installed to secure the front of the wheelchair. The components of each element shall be as follows:

1. Wheelchair Locks. At each wheelchair position, a set of wheelchair locks shall be provided which will securely hold both rear wheels of the wheelchair in the wheelchair position while the vehicle is in motion. The wheelchair locks shall be capable of easily adjusting laterally without the use of tools to hold a wheelchair with a width from outside to outside of wheels and hand-rims of 25 inches and a wheelchair with a width from inside to inside of wheels of 16.75 inches.

2. Belt-track System. This part of the securement system shall be similar to the front portion of an Aeroquip Corporation Wheelchair Securement System (or an approved equal). However, a two point attachment system to secure the front of the wheelchair shall be used composed of one piece of track and two separate belts. The belts shall include all necessary buckles (both buckles shall be ratchet, or tensioning, buckles), hardware, fittings and other parts to make it a complete system. One piece of track (Aeroquip Series A or E, or equal) of sufficient length for proper attachment and positioning of the belts shall be placed perpendicular to the direction in which the wheelchair position (WCP) faces. The minimum length of track for one WCP shall be 36 inches and for two WCPs placed side-by-side shall be 62 inches. However, in every case the track shall project a minimum of 4" beyond the edge of the WCP. The track shall be located immediately to the front of the front wheels of the wheelchair when the rear wheels are locked into position (the distance of the centerline of the track from the inside surface of the wheelchair lock shall be a minimum of 32 inches).

(b) System B. This system shall be composed of the following elements. At each wheelchair position (WCP) a four point attachment system shall be used consisting of four separate belts with all necessary buckles, hardware, fittings and other parts to make it a complete wheelchair securement system. Two of the buckles shall be ratchet (tensioning) buckles. A minimum of two tracks (Aeroquip Series A or E, or equal), each of sufficient length for proper attachment and positioning of the belts, shall be placed parallel to each other and perpendicular to the direction in which the WCP faces. The minimum length of each piece of floor track shall be 36 inches. The track at

the rear of the WCP shall be located immediately to the rear of the rear wheels of the wheelchair when properly located in the WCP and the track at the front of the WCP shall be located immediately to the front of the front wheels of the wheelchair (the distance between centerlines of the tracks shall be approximately 27 inches).

The tracks shall be securely mounted to the floor of the vehicle in such a way as to insure the track will not pull away from the van floor or shift position under anticipated loads. Care should be taken to avoid damage to any of the vehicle's components during installation of the wheelchair securement system. Particular care should be taken to avoid damage to the fuel tank(s) during and after installation of the floor tracks. One method which has been used to avoid damage is to remove the fuel tank(s) from the vehicle prior to drilling of the track bolt holes; to prevent puncturing of the tank(s). After bolting the tracks to the floor any excess bolt length should be cut off. Then the tanks can be remounted with consideration given to using wooden spacers, treated to resist rotting, between the underside of the floor and the top of the tank(s). The purpose for the spacers is to block the tank away from the floor to prevent the bolt ends and nuts from rubbing holes into the fuel tank. If removed, the fuel tank(s) should be reinstalled securely and safely. It should be noted that the method of installing the track is the sole responsibility of the vendor and he may use whatever method will obtain the required results.

It should be noted that several of the optional floor plans will require both securement systems (A and B). Reference should be made to the example floor plans (attached) to ascertain where each system is required.

In addition, provisions shall be made, in the wheelchair position area, to hang the straps and buckles off the floor when they are not in use. The stored straps shall not interfere with passenger movement or sitting space. This shall be accomplished by installing a piece of track, of the same type and model provided for the securement system, of appropriate length so that all the belts of the system can be attached to it. Also, the vendor shall provide with each van upon delivery a pamphlet, brochure or similar literature describing (and instructing) the use of the wheelchair securement system and shall demonstrate to the recipient the proper method of using the system.

The bidder shall describe, in detail, with supporting drawings (may be clear hand-drawn sketches) and literature the type, and location, of the wheelchair securement system he intends to furnish as part of his bid.

(4) WHEELCHAIR OCCUPANT RESTRAINT SYSTEM: A restraint system shall be provided for the occupant of the wheelchair at each wheelchair position, as follows:

For Wheelchair Securement System A. The wheelchair occupant restraint system shall be a seat belt assembly permanently attached to the floor or side of the vehicle or to the wheelchair locks supports. Each belt shall be equipped with a retractor or other device which keeps the belt webbing or strap off the floor when the belt is not in use.

For Wheelchair Securement System B. The wheelchair occupant restraint system shall be a seat belt attachable to the wheelchair securement system tracks at the floor level and easily removable when not in use. The seat belt shall not be fastened or attached to any of the belts of the wheelchair securement system.

(J) OPTIONAL EQUIPMENT: Additional optional equipment shall be installed on individual vehicles. The quality of this equipment and the installation techniques used shall, at a minimum, conform to the standard practice of the automotive industry. Vehicles which are to be provided with optional equipment shall conform with the specifications for that equipment. All parts shall be new.

(1) AIR CONDITIONER (OPTION): An air conditioner system shall be provided on certain individual vehicles as an option. The air conditioner system shall consist of both a front air conditioner unit factory-installed by the chassis manufacturer and a rear air conditioner unit. The rear air conditioner unit shall have a cooling capacity of at least 12,000 BTU/hour. Cooling shall be provided throughout the driver and passenger compartments.

(2) INTERNATIONAL ACCESSIBILITY SYMBOL (OPTION): The international accessibility symbol is a symbol placed on a vehicle equipped with a wheelchair lift to indicate that the vehicle is accessible to persons in wheelchairs. The international accessibility symbol shall be affixed to the outside of the vehicle body at the following two locations:

(1) on the side door, and

(2) on the rear of the vehicle.

The international accessibility symbol shall be that symbol depicted on sign D9-6 in the "Manual of Uniform Traffic Control Devices" published by the Federal Highway Administration of the U.S. Department of Transportation. The symbol provided shall be between 5 inches and 12 inches in overall height.

(3) JUMP SEATS (OPTION): Jump seats are fold-down seats installed at the wheelchair positions in a vehicle equipped with a wheelchair lift system. Jump seats are intended to provide increased regular passenger seating capacity when persons in wheelchairs are not being transported. Jump seats may vary from the previously stated requirements for both the design and the dimensions of passenger seats.

Jump seats shall be in addition to the basic number of passenger seating positions required in the vehicle and shall not count toward the minimum passenger seating capacity required. The number of jump seat positions required, and their locations, shall be as specified in Item (H).

Jump seats shall be attached to the interior wall or floor of the vehicle. Jump seats may be forward-facing or aisle-facing or a combination thereof. When folded up, jump seats shall not interfere with the use of wheelchair positions by passengers in wheelchairs. A separate seat belt shall be provided for each jump seat position.

Each jump seat shall have a vinyl-covered cushion on the seat and seat back. Jump seats shall be of sturdy design and construction. Each jump seat shall accommodate one or two seated adult passenger(s) with reasonable comfort.

Jump seats shall be designed to remain in a vertical position when folded-up and if a spring, or other type of mechanism, is used to return the seat from the horizontal to the vertical position, the return mechanism will not create a safety hazard for a passenger arising from the jump seat.

(4) RADIAL TIRES (OPTION): On vehicles on which radial tires are to be provided, all tires shall meet the previously stated requirements for tires and, in addition, all tires shall be radial tires. The bid price submitted for this option should be the additional cost of providing radial tires on the vehicle instead of the tires which would otherwise have been provided.

(5) TWO-WAY RADIO (OPTION): This shall be a two-way radio installed on the vehicle, per specifications for this item.

(6) RUSTPROOFING (OPTION): This item requires that a compound or sealant be applied to all appropriate interior and exterior surfaces of the vehicle to retard rusting of the metal. Seams must be penetrated by the compound. All critical areas including, but not limited to, gravel - water shields, suspension system, battery supports, wheelwells, rocker panels, hidden boxed-in areas, interior of doors, exterior door bottoms, pillars, and clipped-on moldings shall be treated.

Care must be taken that the application does not interfere with any mechanical, electrical, or heat transfer details of the vehicle.

Access holes must not be larger then 3/8 inch and accurately located to maintain structural integrity of body members and to avoid damage to hidden parts. After application, all holes except drain holes will be capped with plastic or rubber seal type caps. Drain holes or passages must be open to assure proper water and moisture drainage after processing.

Any excess rustproofing coating material due to over-spray, drips or runs, shall be removed from the exterior and interior of the vehicle. The entire vehicle shall be clean and free of dirt, grime, debris and so forth after completion of the rustproofing process.

The end product of this specification is to provide for a long, maintenance free life for the body of the vehicle by prevention of premature rust destruction. The rustproofing system used shall be equivalent to or better than the Ziebert Class A Rust Protection System.

The rustproofing system shall be covered by a warranty that is standard to the rustproofing industry and which shall provide for, at a minimum, at least five years of protection from rust.

(K) MAINTENANCE, SERVICE AND WARRANTY:

(1) MAINTENANCE AND INSPECTION SCHEDULE: Each bidder shall furnish a detailed maintenance and inspection schedule for each type of vehicle for which a bid is submitted. The maintenance and inspection schedule shall incorporate the required maintenance and inspection of the basic vehicle and of its subsystems (e.g., wheelchair lift) as prescribed by the respective manufacturers. The maintenance and inspection schedule shall be supplied as an addendum to each bid.

(2) SERVICING: The vehicle and the optional equipment furnished with the vehicle shall be completely serviced and conditioned prior to delivery. All equipment shall be completely installed and all adjustments shall be made which are required to prepare the vehicle and its optional equipment for immediate and continuous operation upon delivery.

(3) SERVICE POLICY AND WARRANTY: The successful vendor shall furnish with each vehicle the manufacturer's owner service policies and warranties for the basic van, the conversion and modification of the vehicle, and all optional equipment.

The warranty for the basic van shall be the manufacturer's standard warranty. Tires shall be covered by the warranty that is standard to the industry, at a minimum.

The warranty for the conversion and modification of the vehicle shall provide that, at a minimum, all repairs and replacements needed due to factory defects shall be furnished and installed promptly without charge by authorized service representatives within the first year or first 12,000 miles after final delivery of the vehicle. The warranty for the conversion and modifications of the vehicle shall also provide that, at a minimum, all necessary service adjustments shall be made promptly without charge by authorized service representatives within the first 90 days after final delivery of the vehicle.

The wheelchair lift system shall be covered by a warranty providing that at a minimum, all replacement parts and repairs needed due to defects in material or workmanship shall be furnished and installed promptly without charge by authorized service representatives within the first year or first 12,000 miles after final delivery of the vehicle.

The optional jump seats shall be covered by a warranty providing that, at a minimum, all replacement parts and repairs needed due to defects in material or workmanship shall be provided without charge within the first year or first 12,000 miles after final delivery of the vehicle. The optional radial tires shall be covered with the warranty that is standard to the tire industry, at a minimum. The optional two-way radio shall be covered by a warranty, per specifications for this item. The optional air conditioner system shall be covered by a warranty providing that, at a minimum, all replacement parts and repairs needed due to defects in material or workmanship shall be provided without charge within the first year or first 12,000 miles after final delivery of the vehicle. The optional rustproofing shall be covered by a warranty that is standard to the rustproofing industry and which shall provide for, at a minimum, at least five years of protection from rust.

The bidder shall describe the warranties he proposes to furnish for the conversion and modification of the vehicle and for the wheelchair lift system as an addendum to his bid.

(L) SUMMARY OF REQUIRED SUPPLEMENTAL INFORMATION:

The following technical information and descriptive material is to be furnished by the bidder as part of his bid.

(1) Description of vehicle and equipment.
(2) Certificate of meeting Federal strength requirements.
(3) Proposed interior floor plan, showing detailed dimensions including location of wheelchair securement system track devices.
(4) Samples or paint charts of standard or available exterior paint colors.
(5) Total capacity of fuel tank(s).
(6) Capacity and make of alternator and battery.
(7) Type and size of tires.
(8) Descriptive material of fire extinguisher and first aid kit.
(9) Maintenance and inspection schedules for the basic vehicle and its subsystems.
(10) Description of the warranties he proposes to furnish for the vehicle and required ancillary equipment.

The following technical information and descriptive material is to be furnished by the bidder as part of his bid, if the item is required on the vehicle.

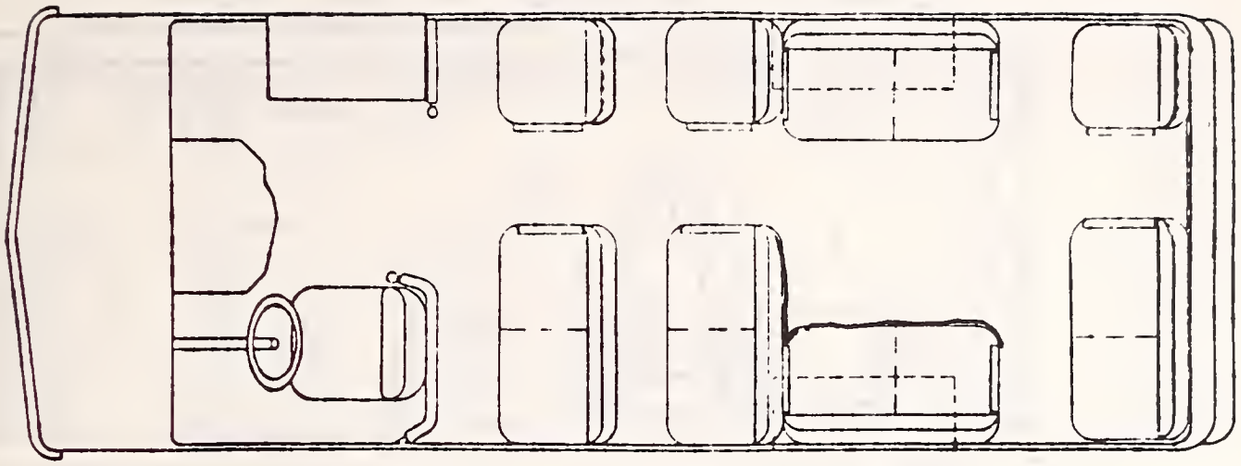
(11) Wheelchair lift information.
(12) Wheelchair securement system information.
(13) Descriptive material of the air conditioning equipment.
(14) Descriptive material of the jump seats.
(15) Descriptive material of the two-way radio.
(16) Detailed description of rustproofing system, including warranty to be provided.

Failure to submit any of the requested supplemental information may lead to disqualification of the bid.

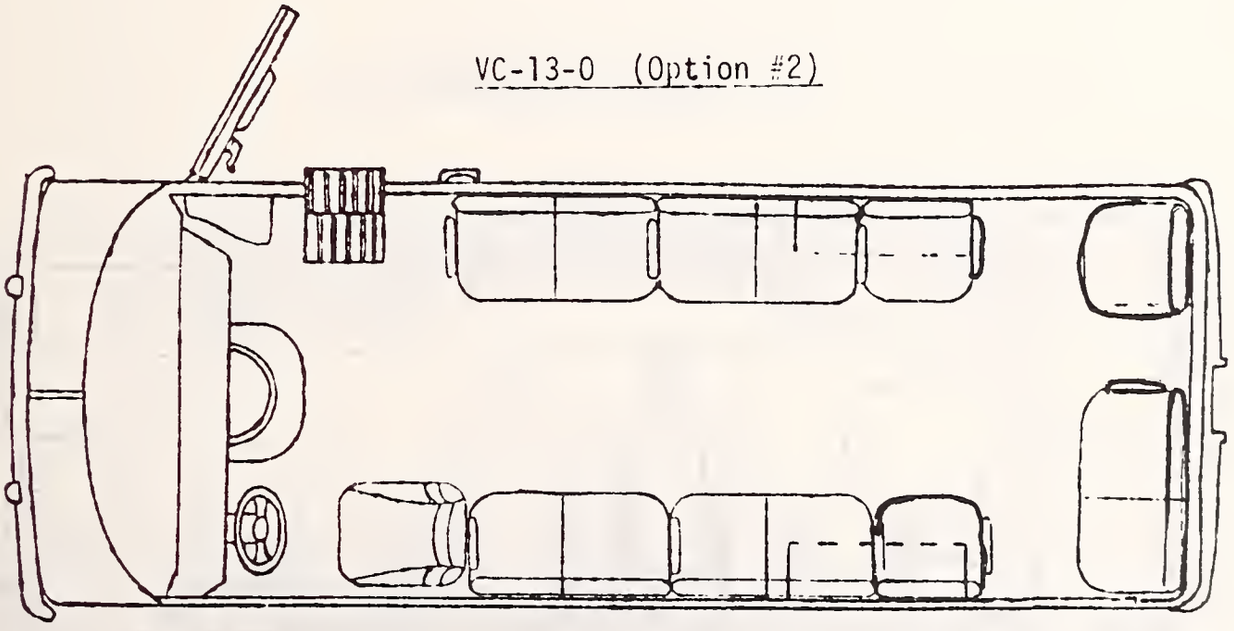
(January 1983)

EXAMPLE FLOOR PLANS
(Converted Vans)

VC-13-0 (Option #1)



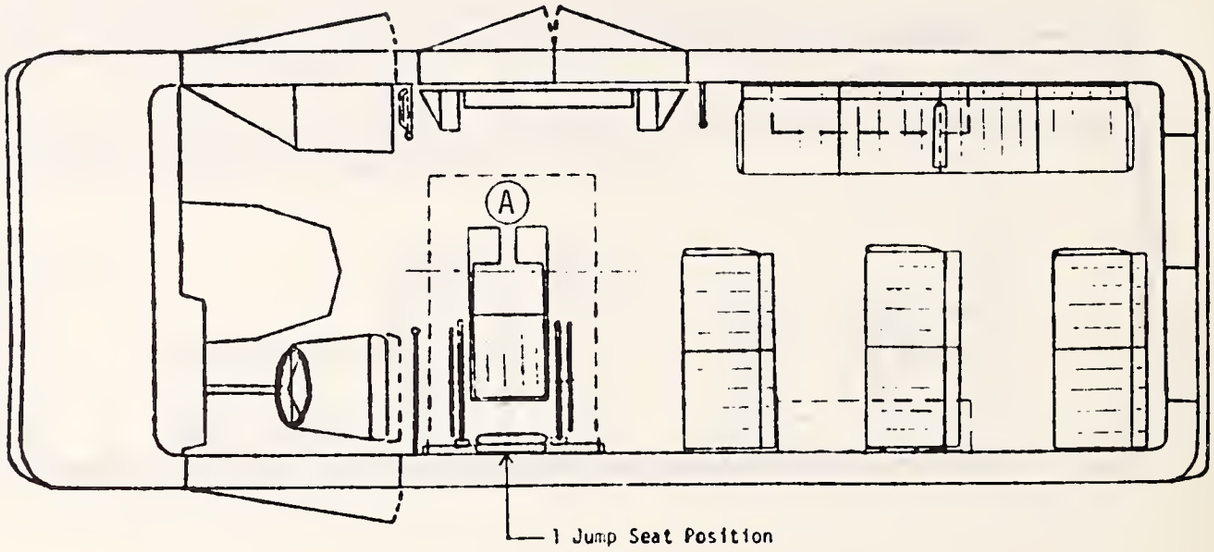
VC-13-0 (Option #2)



(January 1983)

EXAMPLE FLOOR PLANS

VCS-10-1 (Option #1)



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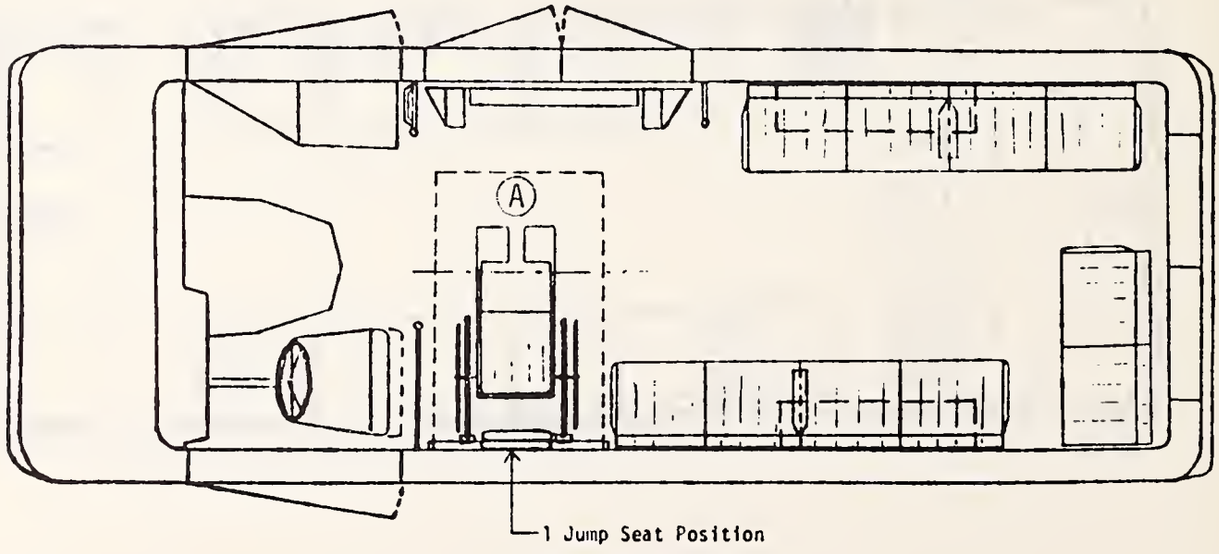
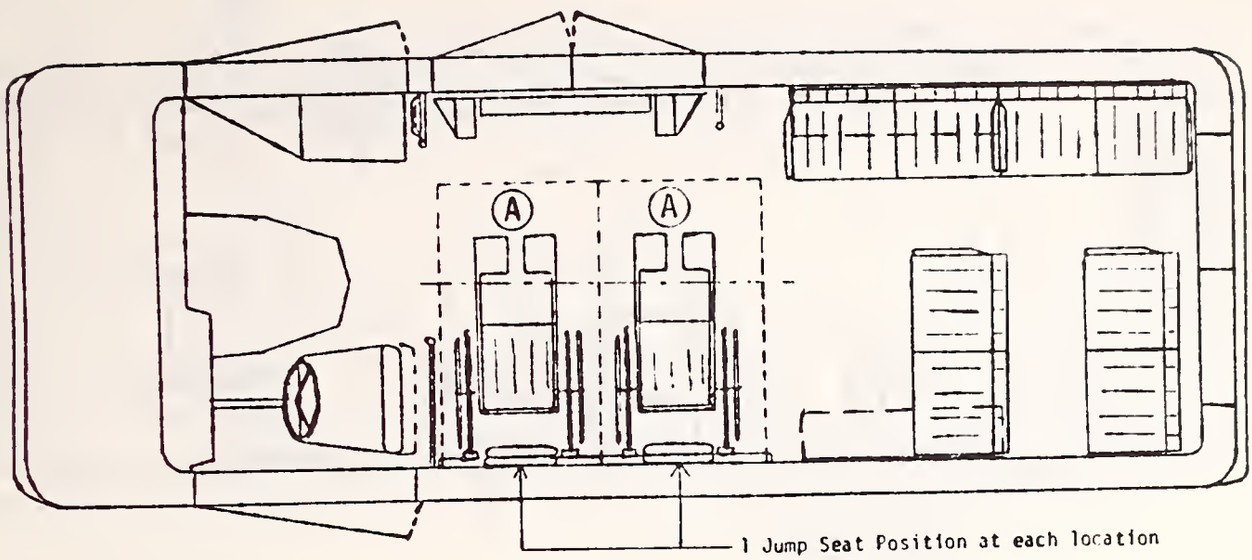


Ⓐ Use Wheelchair Securement System A.
—— . —— Denotes centerline of track.

(January 1983)

EXAMPLE FLOOR PLANS

VCS-8-2 (Option #1)



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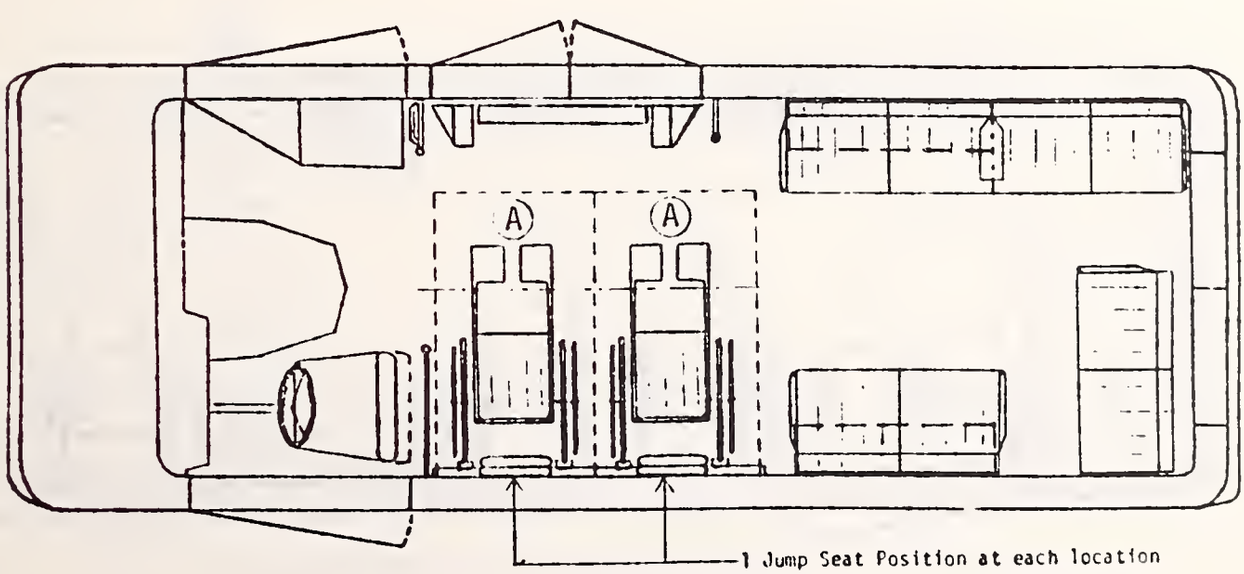
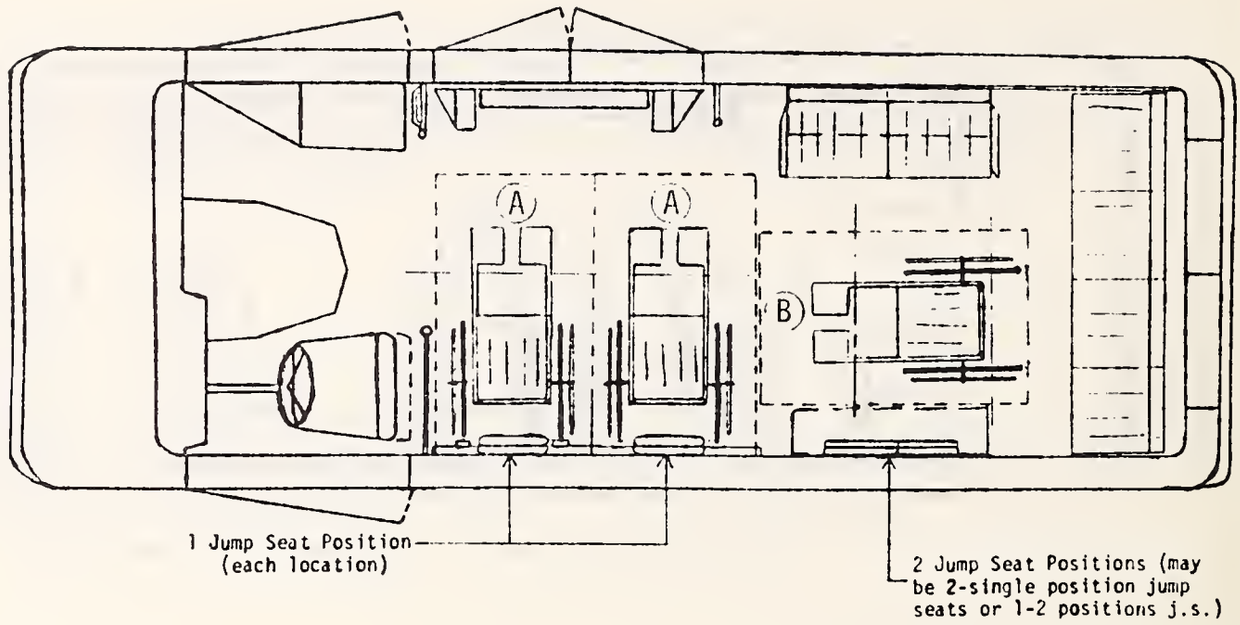


Ⓐ Use Wheelchair Securement System A.
—— . —— Denotes centerline of track.

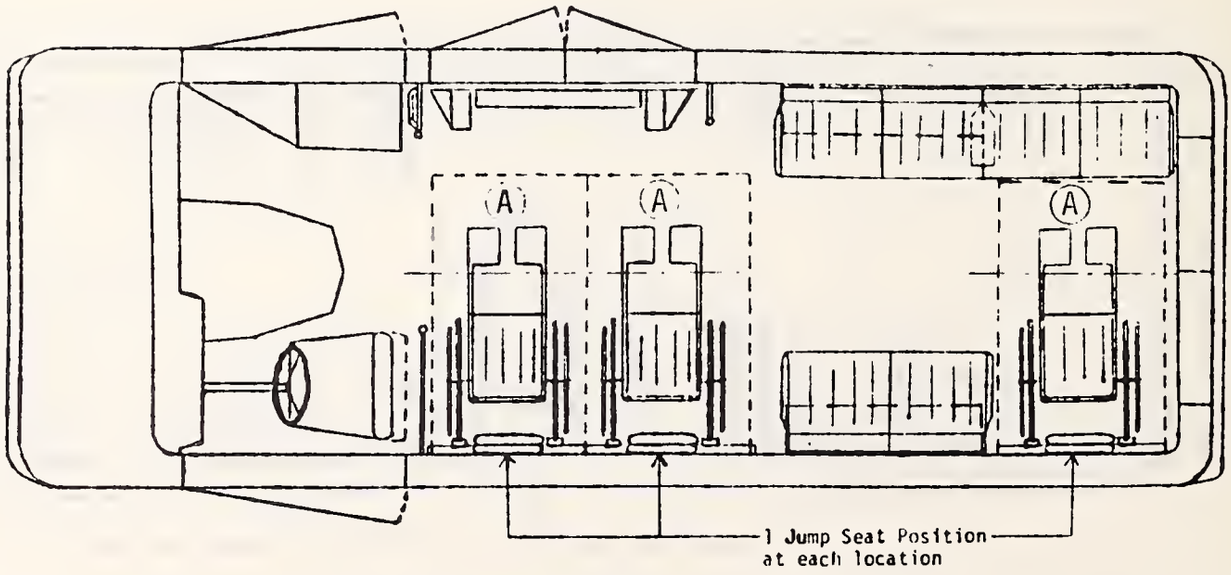
(January 1983)

EXAMPLE FLOOR PLANS

VCS-6-3 (Option #1)



VCS-6-3 (Option #2)

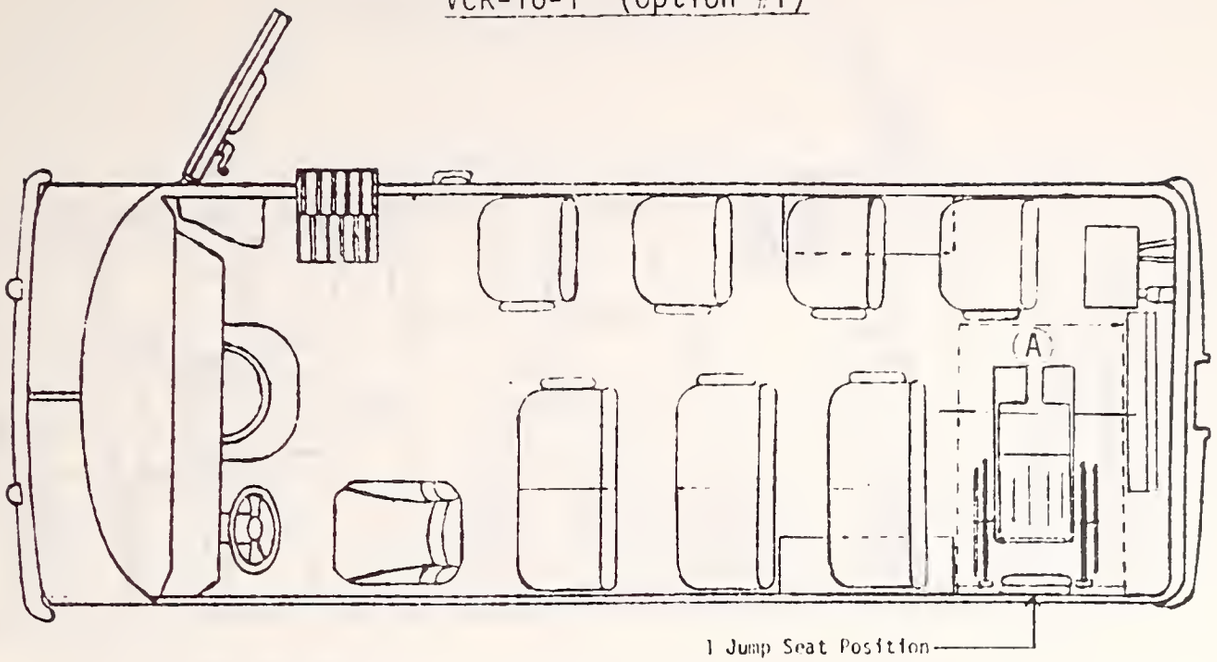


Ⓐ Use Wheelchair Securement System A.
Ⓑ Use wheelchair Securement System B.
—— . —— Denotes centerline of track.

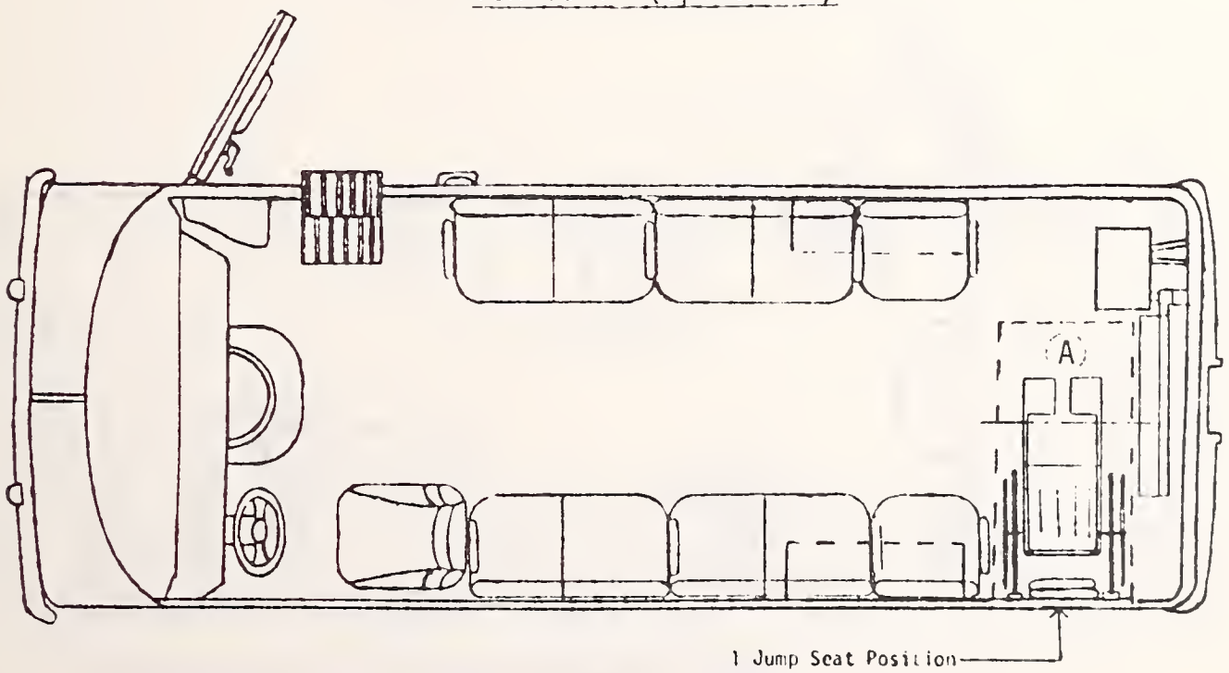
(January 1983)

EXAMPLE FLOOR PLANS

VCR-10-1 (Option #1)



VCR-10-1 (Option #2)

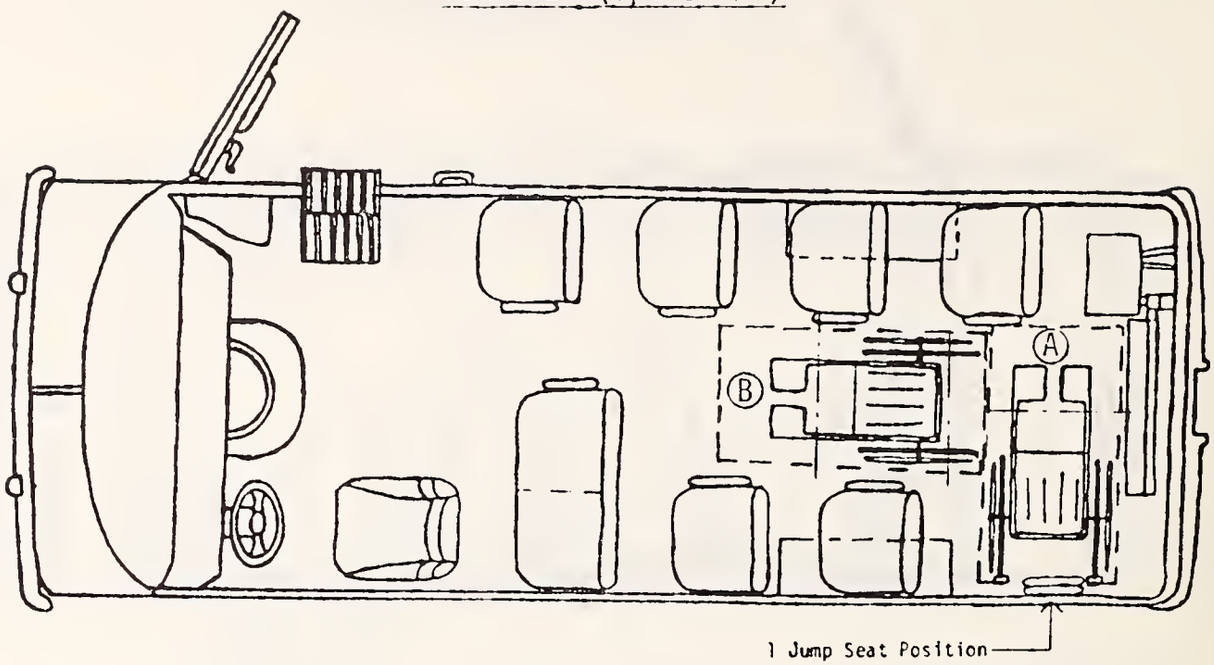


(A) Use Wheelchair Securement System A.
—— . —— Denotes centerline of track.

(January 1983)

EXAMPLE FLOOR PLANS

VCR-8-2 (Option #1)



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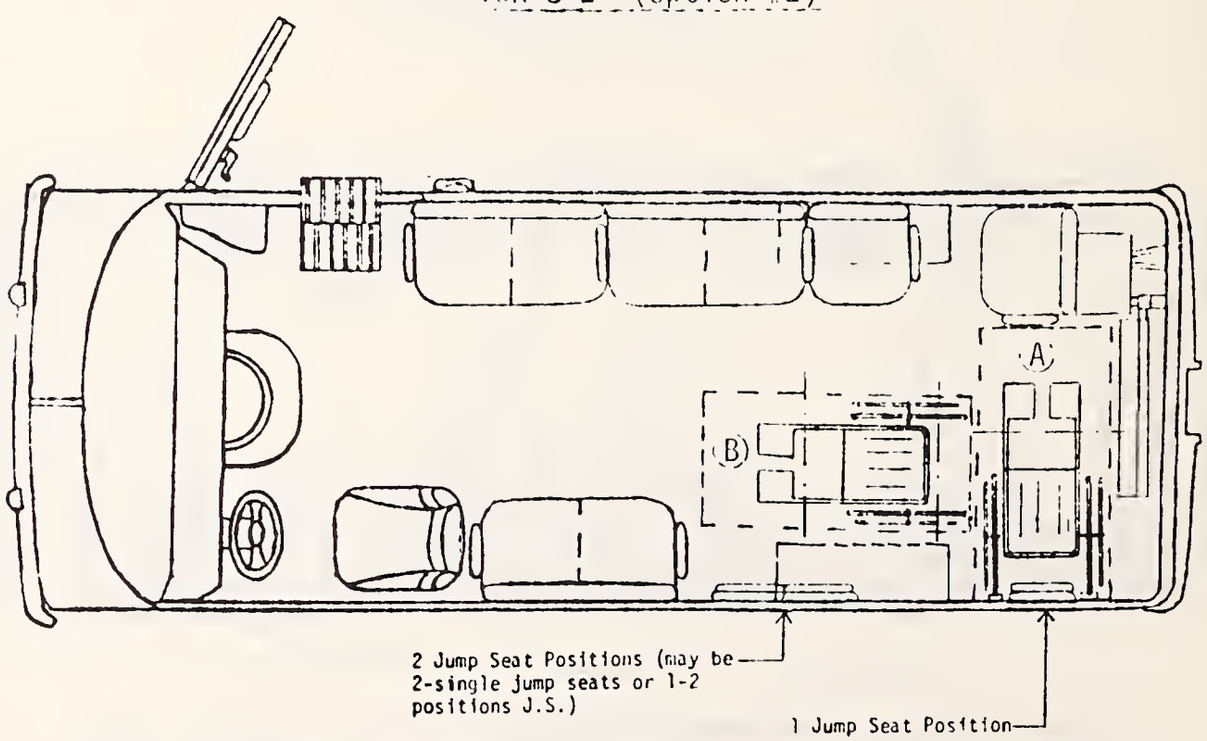
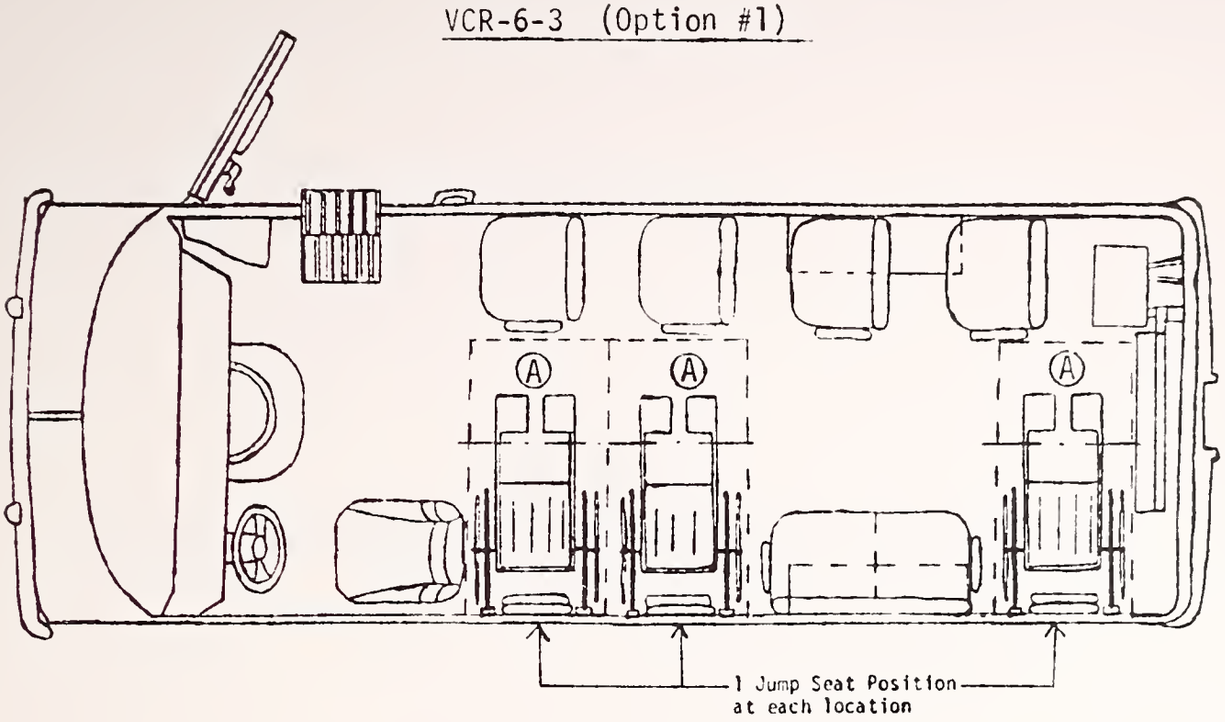


Ⓐ Use Wheelchair Securement System A.
Ⓑ Use Wheelchair Securement System B.
—— . —— Denotes centerline of track.

(January 1983)

EXAMPLE FLOOR PLANS

VCR-6-3 (Option #1)



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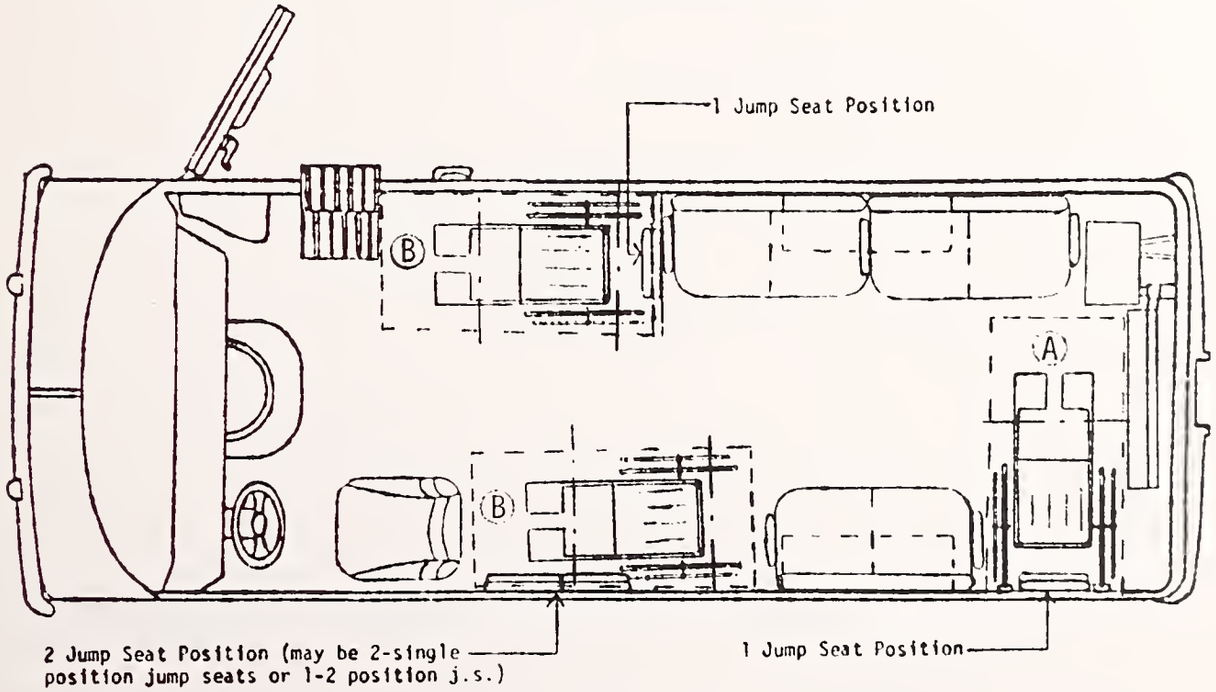

Ⓐ Use Wheelchair Securement System A.
Ⓑ Use Wheelchair Securement System B.
—— . —— Denotes centerline of track.

(January 1983)

APPENDIX B

ILLINOIS DOT DRAFT 20-PASSENGER VEHICLE SPECIFICATION

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ILLINOIS DOT DRAFT 20-PASSENGER VEHICLE SPECIFICATION

This draft specification, prepared for the Illinois Department of Transportation was provided to all participants in the session on Specifications for Van Cutaway and Step Van Chassis Vehicles.

16(b)(2) VEHICLE PROCUREMENT STUDY

DRAFT

prepared for the

ILLINOIS DEPARTMENT OF TRANSPORTATION
DIVISION OF PUBLIC TRANSPORTTION

prepared by

KETRON, INC.

October 1983

SECTION IV. C. VAN C SPECIFICATIONS

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UMTA Project No.

IL-09-8005

DRAFT

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TWENTY (20) PASSENGER VEHICLE
TECHNICAL SPECIFICATIONS

1. General

1.1 Overall Dimensions and Weight

Seating capacity for vehicles configured with all regular seats and no accommodation for wheelchairs or parcels. Configurations for one to four wheelchair positions are also required.	20 passengers
GVWR	11,000 lb. minimum*
Length overall (exclusive of bumpers)	256" maximum
Width overall	96" maximum 90" minimum
Height overall - including all accessories	110" maximum
Wheelbase	146" minimum
Rear Overhang (exclusive of bumpers)	50% of wheelbase (maximum)
Step height from ground	11" maximum
Turning circle - diameter outside body	55' maximum
Interior headroom	72" minimum
Aisle width	14" minimum
Seat width per person (forward facing)	18" minimum
Seat width per person (aisle facing)	17" minimum

*NOTE:

The maximum empty weight (wet) of any vehicle shall not cause the GVWR to be exceeded when loaded to the maximum carying capacity defined by any seating/wheelchair position configuration required in these specifications.

Vehicles with wheelchair lifts shall be configured with one to four wheelchair positions as illustrated in Figure 1. The combined regular seating and wheelchair positions shown in Figure 1 are examples only. The Bidder is to supply diagrams of proposed interior arrangements for all regular seat/wheelchair positions shown in Figure 1 based upon their own vehicle interior dimensions and the requirements of this specification. For each interior arrangement Bidder shall supply diagrams for configurations with and without tip-up seats at each wheelchair position.

1.2 Overall Performance

The specifications for powertrain components in the following subsections are intended to ensure an adequate longevity (100,000 mile minimum) coupled with reasonable vehicle road performance. It is required that the vehicle at GVWR should be capable of:

a) Continuous cruising speed of 55 mph at an engine speed well within the manufacturer's recommended maximum.

b) A sustained speed of 20 mph on a 20% grade in an appropriate gear.

Bidder shall supply all the necessary performance data to justify the powertrain selected. As a minimum this shall include the following performance curves based on the vehicle loaded at the GVWR:

1) Full throttle acceleration. Speed achieved versus time elapsed.

2) Full throttle grade performance in all forward gears against road speed for the gearbox and axle ratio proposed.

3) Engine speed relationship to road speed at full throttle and road load conditions for the proposed driveline configuration.

4) Any available evidence of satisfactory performance of the proposed configuration from other similar operations.

B-8

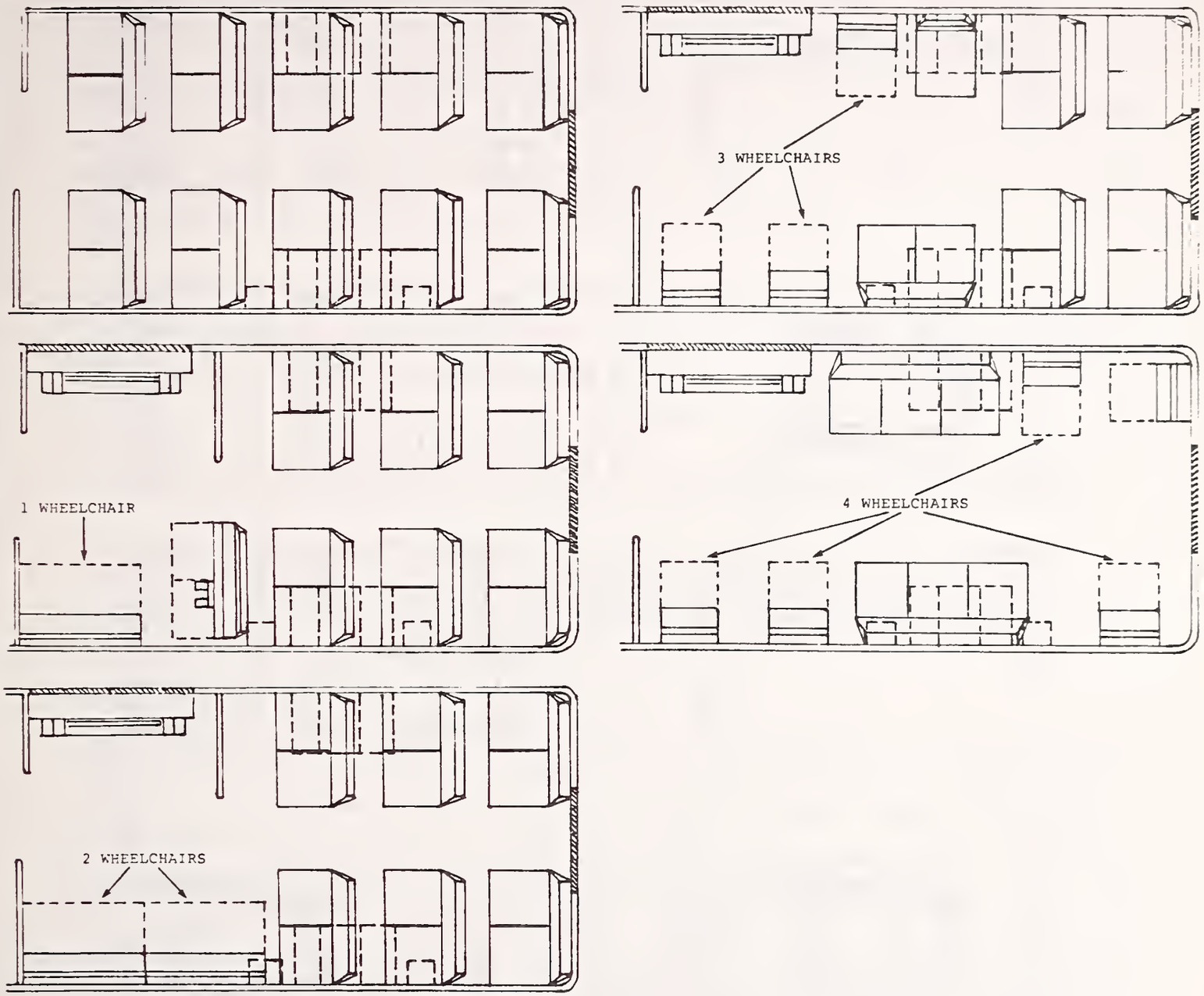

FIGURE 1 TYPICAL SEATING/WHEELCHAIR CONFIGURATIONS FOR A 20 PASSENGER BODY-ON-CHASSIS VEHICLE USING AISLE-FACING WHEELCHAIR POSITIONS

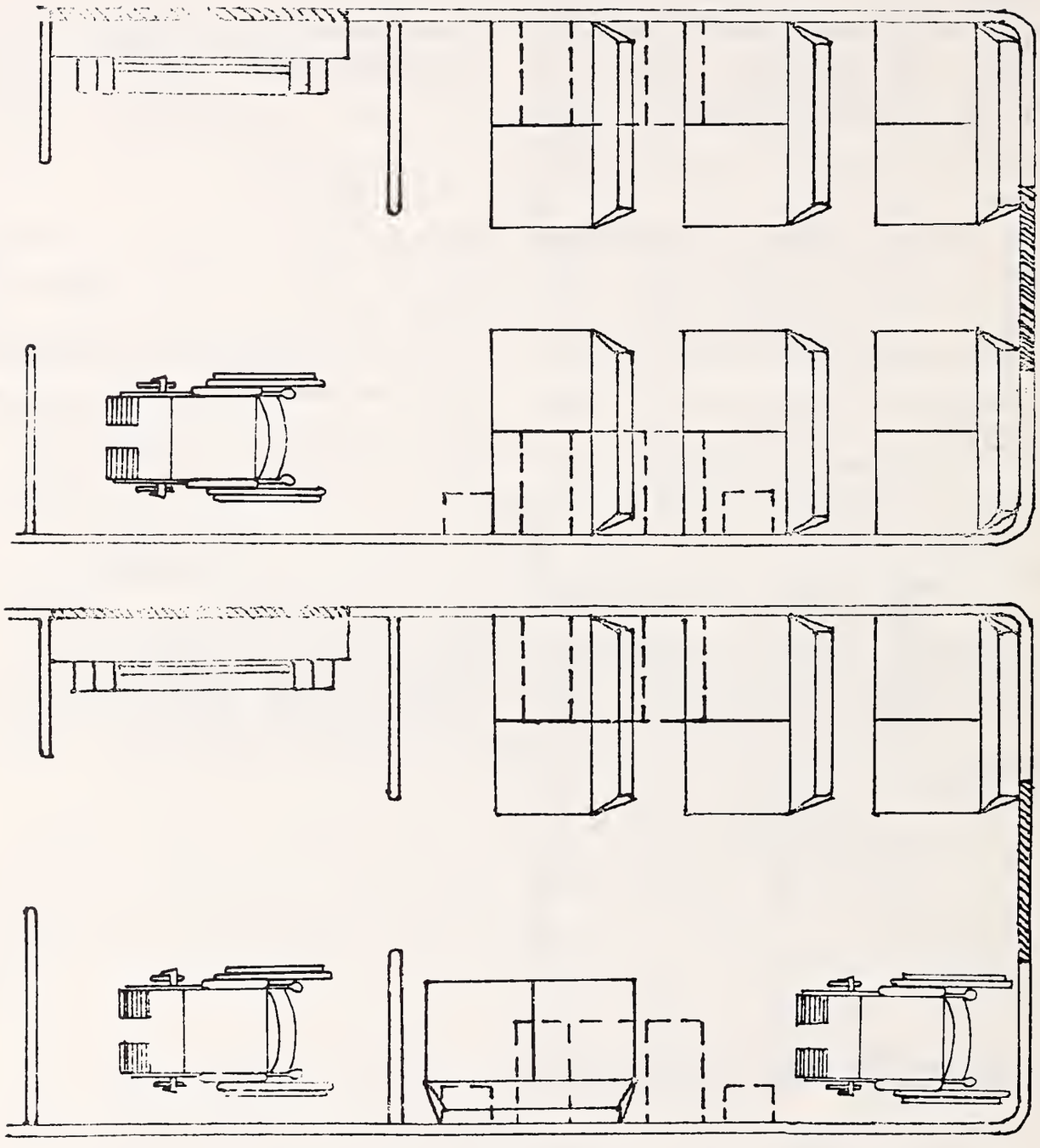

FIGURE 1 TYPICAL SEATING/WHEELCHAIR CONFIGURATIONS FOR A 20 PASSENGER BODY-ON-CHASSIS VEHICLE USING FORWARD-FACING WHEELCHAIR POSITIONS (continued)

2. Engine

2.1 - Gasoline engine shall be heavy-duty truck-type with quality bearings, pistons, and crankshaft designed for sustained full-load operation. The engine displacement shall be at least 450 cu. in. Bidder shall provide certification that the engine meets all applicable EPA noise and toxic fume regulations.

2.2 - Engine shall be furnished with a large capacity full flow oil filter easily reached and replaced without removal of any major component. The oil dip stick and oil fill shall be accessible from outside the vehicle in order to make them easily reached for periodic oil level checks and filling. Diagrams showing access to the dip stick, oil filter, and oil filler pipe shall be provided.

2.3 - An air-cleaner of the oil-bath or dry-type is required. The cleaner must be accessible and removable from outside the vehicle for servicing and replacement.

2.4 - The engine compartment shall be insulated from the passenger compartment with minimum 1" thick fiberglass material or equivalent so as to minimize coach interior noise, level, heat and fumes. Fiberglass should be protected from water, oil and gasoline. The Bidder shall certify as part of the Pre-Bid Qualification and Certification Form that under any vehicle operating conditions interior noise level shall not exceed 82 d.b.a. The Department reserves the right to test vehicles for compliance with this specification as part of the inspection process.

The engine cover shall be firmly secured with easily opened latch devices or screw-type fasteners, and sealed to prevent noise, heat, and fumes from entering the passenger compartment. Minimum 1" thick fiberglass insulation is not required if the engine is completely separate from outside the passenger compartment of the vehicle and meets the stated maximum interior noise level.

3. Cooling System

3.1 - Radiator shall be of the heavy duty type of a sufficient size to properly cool the engine in heavy service.

3.2 - Radiator fan shall maintain engine temperature not to exceed the engine manufacturer's recommendation under all anticipated operating conditions.

3.3 - Bidder shall certify as part of the Pre-Bid Qualification and Certification Form that proper air flow will be provided through the radiator to insure operation within recommended temperatures shall be achieved whether or not the air conditioning condenser is located in front of the radiator. Bidder shall indicate what vehicle components are to be cooled by the fan. Bidder shall guarantee adequate air flow and cooling ability by a demonstrable test upon request by the Department.

3.4 - Radiator surge or overlow tank shall be provided (coolant recovery kit) such that coolant expelled is saved and restored to the cooling system.

3.5 - The coolant shall be protected from freezing with ethylene glycol antifreeze installed to protect the coolant to thirty (30) degrees below zero Fahrenheit or lower.

3.6 - Low points in the cooling system shall be equipped with drain cocks or plugs.

3.7 - The cooling system shall be equipped with an automatic pressure relief cap. The cooling system shall be designed to withstand operating pressures without leaking and be protected to prevent extreme pressure build-up.

3.8 - Adequate access shall be provided for easy inspection and filling of the cooling system from outside the vehicle without removing any other equipment.

4. Fuel System

4.1 - Fuel tank shall be a minimum 30 United States gallon capacity, internally baffled to prevent surging, and ridigly supported at a minimum of four points with supports arranged for easy removal.

4.2 - An engine mounted fuel filter is required with replaceable type elements. Filter should be of the see-through type and located to allow for visual inspection.

4.3 - The fuel filler pipe shall be so designed as to permit filling to the "full" point with no back splash when fuel fill nozzle shuts off.

4.4 - The fuel filler pipe cap shall be made captive to the fuel filler pipe by means of a hinge or other device.

4.5 - Notwithstanding the above requirements, the fuel system, in its entirety, shall meet the requirements of FMVSS 301.

5. Exhaust System

5.1 - The vehicle shall be equipped with an exhaust system which meets United States Government noise level and exhaust emission (smoke and noxious gases) requirements. A certificate stating compliance shall be provided to the buyer with each vehicle at the time of, or prior to delivery as follows:

a) Gases and vapors emanating from the crankcase of spark ignition engines are controlled in such a manner as to minimize their escape to the atmosphere. (Such control may provide for the return of such gases to the induction system of the engine.)

b) Visible emissions from the exhaust pipe will not exceed #1 on the Ringlemann Scale when measured at a point 6" from the tailpipe, with the vehicle in a steady state of operation. (The Ringlemann Scale is well-known to automotive manufacturers and is published in the United States Bureau of Mines Information Circular 7718, for those wishing details.)

When the vehicle has idled for three minutes and then accelerates to 80% of rated speed under load, the opacity of the exhaust will not exceed #2 on the Ringlemann Scale thereafter.

5.2 - The exhaust muffler shall be heavy plate-type designed with proper acoustical qualities and tailored to the engine requirements and installation.

5.3 - The exhaust and tail pipes shall be so designed as to provide sufficient clearance from the street and the running gear under all operating conditions. No part of the exhaust system shall interfere with the axle or any part of the bus when the bus body is raised on jacking pads. Bidder shall provide diagrams showing location of exhaust system and jacking pads as part of Pre-Bid Qualification and Certification Form.

5.4 - The muffler and tail pipe shall be installed so as to allow easy access to engine accessories and to avoid damage to engine appurtenances due to excessive heat.

5.5 - The exhaust system shall be completely sealed and insulated to prevent fumes or smoke from entering the bus interior and to prevent excessive heat from causing a burn or fire hazard.

6. Transmission

6.1 - Transmission shall be fully automatic, power shift, hydraulic drive type. The transmission shall be installed such that removal as a unit without disturbing engine or final drive is possible.

6.2 - Automatic transmission shall be three-speed hydraulic and equipped with an auxiliary water-oil or air-oil heat exchanger (transmission cooler) to maintain safe operating temperature at all anticipated operating conditions.

6.3 - The bidder is required to certify that the automatic transmission provided is of adequate strength and capacity to perform under the frequent start-stop duty cycle anticipated for these vehicles, and that adequate transmission fluid cooling is provided for heavy load operation.

6.4 - The automatic transmission dip stick and fluid filler pipe shall both be easily accessible from outside the vehicle. Diagrams which show the locations of the dip stick and filler pipe must be provided as part of the Pre-Bid Qualification and Certification Document.

6.5 - Transmission flud filter shall be readily accessible for periodic maintenance.

6.6 - Transmission shift lever shall be interlocked with starting motor to prevent engagement of starter in any gear position other than neutral or park.

7. Front Suspension

Axle and Spring capacity - 3,900 pounds minimum

Solid tubular or beam axle, or independent front suspension is allowable. All friction points shall be equipped with fittings for periodic lubrication. All friction points on either type of suspension shall be equipped with replaceable bushings or inserts. The manufacturer's heaviest duty, highest quality spindles and front wheel bearings shall be fitted. The heaviest duty available shock absorbers shall be provided.

8. Rear Axle and Final Drive

Conventional construction, truck-type rear axle, utilizing heavy tubes pressed into cast center section, or one piece casting is required. Ring gear should be bolted, not riveted, to differential carrier. Axle ratio supplied should be the manufacturer's standard, or approved option, and capable of providing the vehicle performance requirements in Section 1.2 of these specifications.

Axle and Spring capacity - 7,500 pounds minimum

The heaviest duty available shock absorbers shall be provided.

9. Propeller Shaft

The propeller shafting shall be a minimum of 2.75" O.D. heavy-duty type, utilizing one or more spicer needle bearing universal joints or equivalent. Guards for the propeller shaft are required to prevent any section of the shaft from entering the vehicle or striking the ground in case of failure.

10. Steering

10.1 - Vehicle shall be equipped with power steering.

10.2 - Steering mechanism shall be constructed so as to make the wheel free from road shock and vibration. Steering from full left to full right turn shall be accomplished in no more than five complete turns of the steering wheel. Steering mechanism shall be self-centering, requiring little or no effort for the operator to bring the vehicle back to a straight-ahead position after turning. Steering wheel shall be not less than 16 inches or more than 20 inches in diameter and the wheel ring shall be of all plastic or

synthetic resin construction, molded over metal. Further, it shall be provided with puller holes in the hub so that a standard or Universal puller may be used.

10.3 - Provision shall be made for easy external adjustment of steering gear backlash.

10.4 - All steering linkage wear points, including the rod ends, shall be fitted with lubrication fittings and replaceable bushings or inserts.

10.5 - The power steering fluid level check and fill points shall be accessible from outside the vehicle to make them easily reached for periodic servicing.

11. Brakes

11.1 - Service brakes shall be largest available four wheel internal expanding or disc type, power operated, and fully conform to all FMVSS Standards including Numbers 105 and 106.

11.2 - The brake dimensions shall conform to the following minimums:

Front disc brakes - 12.5" diameter rotor with 45.8 square inch front pad

Rear drum brakes - 12" X 3" drum with 147.4 square inch rear lining

11.3 - The brakes shall be self-adjusting. All brake components shall be of heavy-duty design to give maximum life.

11.4 - Routing of the brake lines shall be such as to eliminate the possible incidence of corrosion from road salt or other chemicals.

11.5 - All brake lines and other parts of the brake system will be installed in such a way as to insure that proper adjustment and mechanical performance is maintained under the frequent stopping and starting service characteristics for which the vehicle is intended.

11.6 - The builder shall check the maximum braking efficiency with a full complement of fuel, oil, and water to insure proper braking efficiency. Use of a Tapley decelerometer is recommended. Certification stating date, location, and results of the tests done on vehicles must be furnished with each vehicle at the time of delivery. Results of brake tests performed as part of Illinois Vehicle Safety Lane Inspection Tests may be provided to satisfy this requirement subject to the approval of the Department.

11.7 - The brakes shall be free of objectionable noise or squeal when applied.

11.8 - Parking brake shall be mechanical type brake lever activating rear wheel brakes and shall meet all Federal Motor Vehicle Safety Standards including Number 105.

12. Wheels

12.1 - Vehicles shall be equipped with the heaviest duty available one piece ventilated pressed steel wheels which shall be machined and balanced.

12.2 - Wheels shall be a minimum of 16.5" in diameter and 6.0" in width, single front and dual in rear. The heaviest duty available wheel bearings shall be supplied.

13. Tires

13.1 - Vehicles are to be equipped with six tubeless polyester tires with minimum size of 8.75 X 16.5. Tires shall be minimum load range E (10 ply rating). Contractor may install such tires on the chassis after shipment from the chassis manufacturer if chassis cannot be ordered from the manufacturer with these tires and if Contractor provides documentation to the Department prior to vehicle delivery to purchasers, showing that these tires are appropriate and approved for use on the chassis by the chassis manufacturer.

13.2 - Spare wheel and tire assembly as used on the bus shall be supplied with each vehicle.

13.3 - Vehicle jack and tire tool shall be provided and these shall be stored on the vehicle in a fastened position. The jack shall have a minimum rating of 6 tons. Storage for all such accessories shall not interfere with the passenger area, doors, or the safe operation of the vehicle.

OPTION:

> Bidder to supply quotation for providing 7 steel belted radial tires in lieu of the above. Tires to be of heavy duty construction with reinforced sidewalls and antiscuff features. Bidder to supply details of manufacturer and features with the Pre-Bid Qualification and Certification Form.

14. Electrical System

14.1 - The vehicle is to be supplied with an alternator powered 12-volt extreme duty electrical system. All components are to be selected and integrated to function in an environment characterized by low engine (alternator) speeds and high amperage draws (due to lights, flashers, air conditioning or heater, and other accessories in constant operation).

14.2 - An alternator of at least 130 amperes rated output is required. The alternator is to be supplied with an external regulator. The vehicle is to be fitted with a battery capacity of 120 ampere hour minimum rating. A dual battery system located in the engine compartment is to be provided, with easy access to the batteries. A diagram for the battery installation must be furnished.

Provision shall be made to prevent corrosive gases given off by any battery from affecting any other components or equipment.

14.3 - All accessories and electrical equipment with the exception of headlights, taillights, interior lights, and emergency lights are to be wired through the vehicle ignition switch so as to prevent battery drain when the engine is not running. This shall include the air conditioning system and the electrically-driven pump for the wheelchair lift on the units so equipped.

14.4 - Wiring

a) All wiring shall conform to the current standards of the Society of Automotive Engineers and be of sufficient size to carry the required current without excessive voltage drop. The wire shall have adequate mechanical strength for the application and be of a sufficient gauge size to carry the current without overheating. All wiring and related devices shall be installed in a quality workmanship manner and be mechanically and electrically secure.

b) All wiring shall be color coded or permanently and continuously numbered for ease of identification and must be continuously loomed. All wiring shall be adequately protected from water, solvents, road splash, stones, grease, oil, fuel, abrasion and chafing.

c) All wires shall be of sufficient length to provide a loop at terminals so as to permit ample slack for directional positioning. General and engine compartment wiring shall comply with SAE Standard J558a for general purpose thermoplastic braidless-type or approved equal.

d) All wires and cables subject to extreme heat shall have silicone insulation with 2-ply glass braid outer covering and further protected by shields where necessary to prevent premature failure.

e) All parts of the wiring system shall be adequately protected from corrosion.

f) Battery cables shall be heavy duty and adequate to carry current output of the electrical system.

g) Grounding shall not be through hinged door or any other cover.

h) No "T" splices shall be made in wiring unless prior approval is given. All harness and wiring shall terminate at appropriate junction terminals set in bakelite or molded plastic material.

i) All wiring and connectors shall be of the soldered insulated or machine staked type. All circuits shall be protected by manual or automatic reset circuit breakers or fuses. All circuit breakers shall be clearly identified. Fuses and fuse blocks, if used, shall be clearly identified and easily accessible from inside the vehicle. Fuses shall be placed in a single block. The fuse block shall contain holders for spare fuses of each type.

j) Devices such as lamps and wiring requiring periodic checking and servicing shall be readily and easily accessible and serviceable. All exterior devices shall be sealed to prevent entrance of water.

14.5 - Electronic ignition system shall be provided.

14.6 - The best available spark plug wire shall be provided.

14.7 - Starter must be capable of turning over engine with attached accessories with SAE 10-W oil after 10 hours cold-soak at 0 degrees F.

14.8 - Heavy duty dual 12-volt horns shall be furnished and installed so as to be protected from wheel wash.

15. Instruments and Controls

15.1 - The following instruments are to be provided:

- Speedometer with odometer;
- Ammeter or voltmeter;
- Oil pressure gauge;
- Fuel tank level gauge;
- Engine temperature gauge or over-heat warning light;
- Headlight high beam indicator; and
- Directional signal and flasher action light.

15.2 - The following controls, in addition to the normal steering, braking and transmission functions, are to be provided:

- Column mounted turn signal lever;
- Emergency flasher control;
- Door control which shall be easily operated manually at driver's right hand and within arms reach for a person 5'0" height;
- Master exterior light switch, and auxiliary switches for any clearance or marker lights;
- Switches must all be of uniform type;
- Switches and temperature controls for passenger compartment heaters and air conditioners;
- Separate switch and temperature controls for driver heaters, defrosters, and air conditioners;
- Key start or push button starter switch;
- Two-speed wiper/washer control; and
- Passenger compartment lights.

15.3 - All controls and instruments are to be within driver's arm reach with seat belt fastened. All switches are to be of uniform type, either push-pull or rocker type, mounted in convenient groupings in a panel near the driver's left hand.

16. Body Structure

16.1 - The body structure shall be built as an integral unit. The Bidder shall certify as part of the Pre-Bid Qualification and Certification Form that the vehicle meets all Federal and State Regulations applicable to 20 adult passenger vehicles regarding collision strength, impact resistance, and passenger safety, including FMVSS 220 and 221. Bidder shall supply test results together with complete details of all body structure construction, materials and joints.

16.2 - The Bidder shall certify as part of the Pre-Bid Qualification and Certification Form that all joints and corners where stress concentration may occur are adequately reinforced to fully withstand the required loads and road shock that a bus-type vehicle is exposed to in both urban and rural service, and to maximize the likelihood that the body will retain its integrity in a roll-over accident.

16.3 - The side and end framing shall be so designed and constructed that they will carry their proportion of the stresses around these openings. All posts in body side and roof sections shall be of durable channel or box construction securely fastened to the underframe structure so that the entire frame shall act as one unit without any movement at the joining points. The end posts shall be designed to resist shear.

16.4 - All exterior panels shall be attached to the framing by riveting, welding, or with adhesive materials. The location and use of adhesive materials must meet with the prior approval of the

Department. Panels shall be lapped unless continuously welded and the upper or forward panel shall form a watershed by being lapped over the following panel so that the sealing of the panels is not dependent on caulking alone. All exterior joints and seams shall be protected by the application of caulking compund of zinc chromate type, Butyl rubber tape, or approved equal. Body shall be thoroughly water tested and made tight to prevent leakage. Written documentation outlining water test procedures and results shall be provided by the bidder for approval.

16.5 - Roof gutters shall be installed over the windows and doors. Gutters shall be so designed as not to spill water on operator's exterior mirrors and intermediate drain holes shall not drain water on windows or doors.

16.6 - All metal body parts shall be given a thorough multiple stage anti-corrosion treatment. Zinc chromate or zinc phosphate prime paint shall be applied to both aluminum and steel. Interior surfaces of body panels and posts which are covered by trim materials shall be given protection against corrosion.

16.7 - All nuts, bolts, clips, washers, clamps, and like fasteners shall be zinc cadmium plated, or phosphate coated to prevent corrosion.

16.8 - Stepwells are to be of heavy duty construction of molded fiberglass, corrosion resistant steel, or steel treated with approved corrosion protection, with coved or square corners and adequate reinforcement to prevent deflection. Stepwell treads shall be at least 8.5" deep. Individual risers shall not exceed 8" in height. All risers shall be the same height.

16.9 - The wheelhouses shall be of sturdy construction of galvanized or treated corrosion resistant steel or anodized aluminum. Ample clearance under load, and under all positions of

the suspension and steering geometry shall be provided between the wheel-housing and tires. In the event that tires extend beyond the side of the vehicle, splash aprons and fenders shall be provided.

16.10 - Access doors shall be provided, where necessary, to service transmission, engine, radiator, batteries, and air conditioning components.

16.11 - The entire body-frame understructure of the vehicle is to be fully undercoated with nonflammable high quality undercoating material, and shall require the prior approval of the Department.

16.12 - Chromium-plated trim pieces are not acceptable. Any bright metal exterior trim shall be stainless steel or anodized aluminum.

16.13 - The body structure shall be built as an integral unit.

16.14 - The bumpers shall wrap around the corners of the coach and be of a heavy-duty shock absorbing design (Firestone Help or approved equal). The installation of the rear bumper shall include an anti-ride shield to prevent hitching of rides.

17. Doors

17.1 - The vehicle shall be equipped with a manually operated front entrance door with over center linkage of self-locking type located opposite the driver. The door shall be a two section outward folding door. Meeting edges shall be equipped with 2" extruded rubber edges on each section that overlap to form a tight seal.

17.2 - The entrance door shall have a clear opening width of at least 28" and a full height of at least 74".

17.3 - Entrance door shall be equipped with windows of adequate size and placed so as to allow the driver to see and judge curb location when stopping.

17.4 - The vehicle shall be equipped with a rear outward opening emergency door/doors with appropriate operating instructions clearly written and placed in an apparent location. Access to the door shall not be obstructed either by seats or other interior hardware and the door shall be easily operated from both outside and inside the bus. The door shall incorporate glazing in both the upper and lower sections to provide the maximum rearward visibility from inside the bus. Bidder shall supply diagrams and dimensions of proposed emergency door with Pre-Bid Qualification and Certification Form.

17.5 - Separate wheelchair lift access doors shall be provided on buses with wheelchair lifts. When in full open position, wheelchair lift access doors should be firmly fixed in position and provide a clear opening between the floor and lintel of 67" minimum. Manufacturer shall provide diagram with bid showing how doors will be fixed in place. An interlock system shall be provided that will prevent any vehicle movement when lift access doors are open.

17.6 - The structure of all doors, their mounting, inside and outside trim, and any exposed mechanisms shall be of a durable, corrosion-resistant material which is rigidly reinforced. Positive stops to limit door travel in the open and closed positions shall be provided.

17.7 - Doors shall be equipped with a heavy duty lock and shall not rattle in the closed position and shall have durable, firmly installed weather seals to prevent the entrance of air and water and to keep ice from binding the door shafts. The forward door should overlap the rear door for maximum safety and minimum ice and snow entrapment.

17.8 - The doors shall be supported over their whole length with heavy duty hinging. The door design shall provide for adjustments to allow proper alignment. Pivot points on the doors and door shafts shall have bushings or bearings which are either permanently lubricated or able to be easily lubricated.

17.9 - Materials used for weather sealing shall be designed to withstand varying temperature extremes, road splash and salt, and other exterior elements without cracking, leaking, loosening or deteriorating.

17.10 - Provision shall be made for locking and unlocking all doors of the vehicle with key-type locks, except the front manual access door if it is automatically securely locked when in the fully closed position, and if a driver's door is provided. Lock devices shall meet with the approval of the Department.

17.11 - Notwithstanding the above requirements, all doors, installations, and door components shall meet with the prior approval of the Department.

18. Windows

18.1 - Windows shall be split sash; the sash shall be anodized aluminum, rust resistant, horizontal slide type, limited to open approximately 4", by stops. They shall slide freely with minimal effort, of approximately 10 lbs. The window tracks shall be polymer or nylon extrusions. The sash shall have a locking device to latch the window in a closed position. The window design shall prevent the opening and closing of the window due to acceleration and deceleration of the bus. Windows shall not rattle when open or closed. The side window area shall be as large as possible to give passengers an unobstructed exterior view. Windows shall be securely mounted to the main structure of the body. The window

openings shall meet all the provisions of FMVSS 217. Details of the window design and installation shall be submitted as part of the Pre-Bid Qualification and Certification Form, and require the concurrence of the Department.

18.2 - Standee windows, if fitted, shall be fixed type glazed with safety plate glass or approved equal. Glass sections shall be uniform in length.

18.3 - Windshield shall be fixed type, glazed with safety laminated glass, and uniformly tinted or tinted above eye level (gradutint).

18.4 - Safety plate glass, or approved equal, is to be provided in side windows, rear windows, entrance door and driver's window. All glass except the windshield, driver's window and the front and emergency doors shall be tinted bronze with 9% transmittance.

18.5 - The side windows shall be easily replaceable and shall be sized so that they are interchangeable to the maximum extent possible.

18.6 - The sash shall be provided with an emergency push-out feature, designed to allow quick resetting by the bus operator. The number of windows so equipped shall be as specified by FMVSS 217. Emergency push-put instructions shall be furnished and installed by these windows at each seat and wheelchair location. This feature shall meet with requirements of FMVSS 217.

18.7 - All windows shall be fitted with durable, firmly installed weather seals to prevent the entrance of air and water. Materials used for weather seals shall be designed to withstand varying temperature extremes, road splash and salt and other exterior elements without cracking, leaking, loosening or deteriorating.

18.8 - Drain holes shall be incorporated in the sash frame to allow interior condensation to drain to the exterior. Body and sash construction shall be such that the sash drain will prevent entrance or back-up of water into the coach.

19. Windshield Wipers

Two heavy duty electric two-speed windshield wipers controlled by a switch shall be furnished.

Wiper motor shall be mounted in an easily accessible location for ease in inspection, maintenance and removal.

Windshield washer is to be included, with a reservoir easily accessible for filling.

20. Heating, Ventilation and Air Conditioning

20.1 - The vehicle systems shall be designed to provide passenger comfort by heating or cooling, dehumidifying and filtering the air which is force circulated within the coach. The heating system shall be designed to maintain the coach interior temperature at 70±5 degrees F. at all positions in the bus, during all climatic conditions prevailing in the State of Illinois. The air conditioning system (optional) shall be designed to maintain the average coach interior temperature at least 15 degree F. below ambient with a full load of passengers for ambient temperatures in the range of 80°F to 100°F.

Bidders are advised that air conditioning must be available as an option to any purchaser(s) who may require it. However, the price of this item must be identified separately on the BID FORMS, and identified on such forms as OPTION 1.

20.2 - Both heated and air conditioned air shall be evenly distributed in the coach interior. Heated air shall be distributed to stepwell and lift areas to prevent accumulation of ice and snow and to ensure proper lift operation. The driver's area shall have an air conditioned air outlet to ensure driver's comfort. All fans shall be of sufficient size to evenly distribute air without creating drafts or blowing excessively on any passenger.

Switches shall be provided at the driver's position to choose and control either heating, ventilating or air conditioning operation.

20.3 - The heating system shall have at least two unit type heaters, a heater defroster located in the driver's area, and a heater in the passenger area. Total output of the heating system shall be at least 65,000 BTU. The driver's heater-defroster shall operate independently of the passenger area heating system. The front heater shall be easily accessible for repair and maintenance.

The passenger compartment heater shall be located toward the rear of the bus, at least three seat-rows in back of the driver's seat and the installation shall be designed to maintain an even and comfortable heat distribution throughout the vehicle. A valve shall be provided to regulate water flow to the passenger compartment heater. The passenger compartment heater shall be easily accessible for repair and maintenance.

20.4 - All heater fans are to be individually controlled by three position switches, low, high, and off, and the heater defroster system shall be individually controlled for temperature setting from the instrument panel.

20.5 - Vehicle will be equipped with two Transpec Model 1122 roof vents (or approved equal) in the passenger compartment. Bidder shall supply details of proposed installation as part of the Pre-Bid Qualification and Certification Form.

20.6 - A weatherproof adjustable front ventilator of sufficient size to provide ample direct ventilation for brake and accelerator pedal area during summer operation shall be provided. Installation shall be such that the ventilator door will not be damaged due to protrusion beyond the front or side of the vehicle. If the door is of the outward opening type, it must be so arranged that it can be closed from outside the vehicle without distortion. Door shall be sealed against the weather at all times when in a closed position. The ventilator shall be easy to operate and control shall be easily accessible to operator.

20.7 - The requirements of 20.1 not withstanding, the air conditioning system shall be a minimum of 45,000 BTU capacity and use only commercial quality components.

20.8 - It is mandatory that separate individually controlled air conditioning outlets for the driver's compartment be provided.

20.9 - All service valves shall be located for easy maintenance.

20.10 - All lines shall be bracketed and loomed wherever chafing may occur.

20.11 - The condenser core shall be adequate to prevent high head pressures during the A/C operation and shall not be mounted where it will be subjected to excessive amounts of dirt. Condenser core and fan motor shall be mounted so as to permit easy removal. The fan motor shall be secured with rubber resilient material to dampen vibration and noise generated from motor vibration.

20.12 - A skirt mounted condenser appropriately mounted, sealed and installed to minimize the impact of road dirt and dust is preferred. If condenser is roof mounted, fan and all parts shall

be protected from tree branches, etc., with a steel screen or other protective device. Maximum bus height, including such accessories, shall not exceed 110".

20.13 - All vents associated with the heating and air conditioning units shall be fully protected from dirt and other elements that could interfere with or damage the system.

20.14 - The air conditioning evaporator, front heater, defroster and passenger's heater shall have easily replaceable air inlet filters to protect the cores. Filtering media shall be fire-retardant, disposable type, and provide good filtering efficiency.

The requirement for air inlet filters may be deleted by approval of the Department provided that the air inlet vents are located a sufficient distance above the floor to minimize the entrance of dirt and debris into the units.

20.15 - The wiring must meet all specifications required in Section 14.4 where applicable and any sub-contractor who provides air conditioning and/or heating components must meet all specifications.

In addition to the requirements of Section 14.4, the Bidder must certify as part of the Pre-Bid Qualification and Certification Form that the wiring for the heating and air conditioning circuits is adequate to withstand the transient loads expected. These circuits should be protected with resettable breakers or thermal relays.

21. Interior Lighting

21.1 - The lighting intensity for all seat and wheelchair positions shall be adequate to illuminate the vehicle interior during night operation. Bidder shall specify the number, location and light output of interior lights for prior approval of the Department.

21.2 - Lighting lenses shall be sealed to prevent the entrance of dust and insects but shall be easily openable for cleaning and servicing of lamps and lenses.

21.3 - Interior lights shall be operative without the engine running.

21.4 - The lighting intensity for the front stepwell area shall be adequate to illuminate the stepwell area and ground surface for a distance of 3 feet from bottom step edge outward in all directions during night operation.

21.5 - The stepwell and curb lights shall be activated when the front door is open while the engine is running.

21.6 - Stepwell lights shall be shielded to prevent light from directly shining into passenger's or driver's eyes.

21.7 - The driver's area shall have a light to provide sufficient lighting in the steering wheel area during night operation.

22. Exterior Lighting and Warnings

22.1 - All exterior lights must meet State of Illinois and United States Department of Transportation requirements.

22.2 - Headlights of sealed beam type are required with high and low beam controlled from a foot switch on the floor that is sealed and protected from moisture. Sealed beam units shall have a low beam life rating of 600 hours minimum.

22.3 - Directional signals shall meet all federal motor vehicle standards, front and rear. Directional signals shall be operated by lever on left side of steering column.

22.4 - In addition to directional signals, rear lamps shall consists of red combination stop/tail lights.

22.5 - Reflectors on each side of vehicle shall be provided with amber front and red rear.

22.6 - Roof mounted clearance and marker lights are to be recessed or protected to prevent damage from overhanging branches etc. Department to approve the installation.

22.7 - A circuit shall be provided for the directional signals which, when on, will cause them to function as traffic hazard warning signals. Four-way emergency flashers must either be wired so as to override the brake light function if both functions activate the same set of bulb filaments at rear of vehicle, or a conspicuous pair of red or amber separate lights must be installed near the outer rear corners of the vehicle in a manner harmonious with the basic vehicle design, activated by the emergency flasher switch.

22.8 - The flasher unit for directional signals and emergency flashers shall be replaceable from inside the vehicle and shall be a simple plug-in unit.

22.9 - A rear license plate light shall be provided in the license plate well.

22.10 - Two backup lights shall be provided.

22.11 - An audible intermittent warning device shall be provided at the back of the bus to warn of the bus backing up. The alarm shall require the approval of the Department.

23. Interior

23.1 - All interior panels, materials and treatments shall be flame retardant in accordance with FMVSS 302 and treated to be easily cleaned. Colors of coverings and materials shall harmonize with exterior vehicle color. Color of seats shall be of sufficient contrast to that of the floor to provide for depth perception by the visually impaired. Floor color should minimize the impact of dust and dirt. The Department will approve all proposed color schemes.

23.2 - All protruding hazardous surfaces shall be eliminated.

23.3 - Interior lower side panels shall be scuff resistant.

23.4 - The door and instrument panel shall be painted or otherwise finished to match the overall interior tones of interior panels.

23.5 - Inside walls and ceiling shall be adequately insulated to prevent condensation using fiberglass blankets with a minimum of 3/4" thickness and 1.5 pounds per cubic foot density.

23.6 - Floor

a) The sub-floor shall be of minimum 1/2" thick, 5-ply waterproof plywood securely fastened to steel and covered from wall to wall with RCA transit floor, hard rubber, vinyl or approved equal matting. All edges shall be properly sealed to prevent entrance of moisture that could cause bulging, ply separation and/or material failure.

Floor covering shall be smooth and at least 1/8 inch thick under seats and ribbed non-skid 3/16 inch thick in the aisle and wheelchair areas and at the entranceway of both the door and the floor area surrounding the lift. Steps shall be covered with 3/16 inch thick ribbed step treads. The step edge shall be marked in white in conformance with Federal Motor Carrier regulations.

b) All joints shall be the butt type unless another type of joint is approved by the Department. Floor covering shall be cemented and rolled to the floor to prevent bubbles or blisters which could create a safety hazard.

23.7 - Stanchions and Grabrails

a) Grabrails and stanchions shall be 1-1 1/4" in diameter and be constructed of stainless steel or in the case of those that are not padded, either of stainless steel or stainless steel clad tubing. Any stanchions or grabrails that can create a passenger hazard during collision shall be padded with integrally molded black vinyl padding. The padding shall be of an adequate design to mimize an injury to a passenger striking a stanchion in a crash condition and to withstand normal usage as a handhold. Overall design of stanchions including thickness and material of padding shall require the review and approval of the Department.

b) All grabrails and stanchions shall be properly supported and held in place with slip joints sufficiently long to keep stanchion from sliding out. There shall be a 1/4" travel before stanchion bottoms in the socket. Butt end joints in grabrails shall be avoided, but, if necessary they shall be made under a fitting or hanger bracket.

c) All fittings shall be stainless steel and finish of fittings shall match the stanchions as near as possible and shall require the approval of the Department. Each "T" connection shall have a sufficient number of Type 430 stainless steel or hard chrome plated, 1/4" male and female bolts to prevent the "T" joints from slipping. The seam, in the stainless steel covering on the tubes, shall be turned to be out-of-sight as far as possible.

d) Provisions shall be made for grabrails at door, within reach from the ground to assist passengers in both boarding and alighting.

e) A vertical stanchion with a horizontal cross bar shall be located behind the driver's seat which can be used by passengers seated in the forwardmost seats on the left side of the bus. This stanchion shall be placed so that it does not interfere with passengers when entering and leaving the bus but rather serves to facilitate these movements.

f) A vertical stanchion on the rear side of the entry area having a horizontal cross bar which can be used by the passenger seated in the forwardmost seat on the right side of the vehicle shall be furnished.

g) There shall be no less than 1-1/2" of knuckle room clearance at stanchions or grabrails.

h) Passenger Door Barrier - A barrier panel shall be installed at the rear of the front stepwell between the stanchion and the sidewall extending from 0 (zero) to 2 inches above the floor to the horizontal grabrail. Barrier shall be finished on both sides matching interior sidewall panels.

i) For Wheelchair Units - Handhold devices, stanchions or low padded barriers shall be provided for easy reach of each wheelchair position. These shall be made of corrosion resistant steel and capable of sustaining a passenger's weight when used for assistance. They shall be securely anchored and placed in such a manner so as not to present a hazard. With the permission of the Department, armrests may be provided on aisle facing seats adjacent to wheelchair positions to serve in place of the stanchions called for above.

23.8 - Passenger Accomodations

The Bidder shall provide seating arrangement drawings which meet the passenger seating and wheelchair capacity requirements of Section 1 of these specifications. Drawings shall show location and dimensions of all seats, wheelchair restraint, modesty panels, stanchion, and other passenger assists. Proposed seating arrangement plans must be approved by the Department.

23.8.1 - Passenger Seats - Passenger seats shall be covered with commercial grade heavy duty vinyl (42 oz. minimum) or approved equal, fully padded construction and color coordinated with interior and exterior vehicle colors.

Seats shall not have high backs (25" maximum, 19" minimum) and shall not have armrests attached (except as allowed adjacent to wheelchair positions -23.7-i) but shall have a full width padded handhold. Seat covering and padding material shall be fire resistant and shall not support combustion. A passenger restraint system with retractors shall be provided at each seat location.

All seat cushions shall have a minimum depth of 15" and a maximum of 17". All forward facing seats on the same side shall be uniformly spaced from seat back to seat back.

23.8.2 - For forward facing seats the minimum width per person shall be 18" and for aisle facing seats the minimum shall be 17".

Knee to hip room shall be a minimum of 28 inches, measured from the seat back to the face of the following seat.

23.8.3 - For lift-equipped vehicles wheelchair hold downs shall be provided for each wheelchair position as provided for in Section 1 of these specifications. Each wheelchair position will be equipped with a Collins W-80 wheelchair release, or approved equal. The installation shall provide for the accommodation of chairs with both solid and large section pneumatic tires and for electrically powered wheelchairs. Tip-up seats using a Collins W-360 seat or approved equal shall be available as an optional item for each wheelchair position.

The passenger restraint system at wheelchair locations shall be retractable and designed to hold the wheelchair passenger in place incorporating a pelvic belt and an upper torso belt. The belt shall be of sufficient length to secure a person in bulky winter clothing.

23.9 - The driver's seat shall be upholstered in vinyl, equipped with horizontal and vertical adjustment.

The seat shall be pedestal mounted. The full fore and aft range of seat adjustment shall be accommodated in the mounting; specifically, there shall be no interference or pinching hazard between any grabrail or stanchion with the seat in any position.

23.10 - A driver's sun visor shall be provided.

24. Fire, First Aid, and Emergency Equipment

First aid kit, fire axe, five pound dry chemical type A-B-C fire extinguisher, and disabled vehicle warning device shall be provided. These items shall be bracket mounted within a compartment with a hinged door access which shall be provided in the front dash or, with prior approval of the Department, location and fastening of these items may be accomplished in a different manner.

25. Mirrors

25.1 - The exterior mirrors shall meet all the requirements of FMVSS 111. Corrosion-resistant fully adjustable mirrors shall be installed on each side of the coach. Mirrors shall provide an undistorted view of the rear corner of the bus from roof to ground. Bidder shall supply full details of proposed installation for Department approval.

25.2 - The exterior right side mirror shall be located 78" above the ground and if the bus structure limits the location to a lower height, the location will require the prior approval of the Department.

25.3 - Mirror brackets shall not obstruct the driver's field of vision. Mirror arms shall be chrome plated. A convex insert shall be provided on the right-hand mirror.

25.4 - An interior rear view mirror, 4" x 16" shall be mounted ahead of, and above the operator's position to provide a general view of the interior of the bus.

25.5 - All mirrors and installations shall have the prior approval of the Department.

26. Exterior Paint

Exterior paint shall be Dupont Dulux alkyd enamel or approved equal and applied by spray method over zinc chromate primer.

All metal surfaces shall be treated with zinc chromate primer prior to painting.

The paint scheme of all vehicles shall be the same. All vehicles shall be painted a light pastel color with an accent stripe 8"-12"in width, 2"-5" below the window line and extend around the entire vehicle. The stripe color will differ between vehicles. Paint colors and exact color scheme will be supplied to the successful bidder after contract award.

The name of the purchasing agency shall be lettered on the accent stripe.

27. Two-Way Radio

Vehicles furnished on this bid are to be fitted with two-way radio equipment. The bidder shall insure that an adequate 12 volt power supply to a 4 stud terminal block for connecting the radio is provided. This supply shall be sized and protected for 15 amperes.

28. Wheelchair Lift

Lift shall be constructed and installed in the side of the vehicle with the minimum of structural body modifications. The cutting of chassis structural members is prohibited. All changes required to the basic body structure shall provide for adequate reinforcing and load redistribution. Bidder shall certify as part of the Pre-Bid Qualification and Certification Form that the installation is adequate to withstand the stresses imposed by regular lift operation on a sustained basis.

The lift platform shall have a provision for mechanically holding wheelchairs in place as they are raised or lowered. The lift platform shall have a usable minimum width of 32.5", a depth of 42.5" and a minimum height clearance of 67" when in the raised position. Power unit shall be 12 volt electric - hydraulic operated and shall be located inside the vehicle. The power unit shall not cause any objectionable noise in the passenger area. The power unit shall be capable of operation in temperatures down to -20 degrees F., and shall be readily accessible for service. In the event of power failure, the lift platform shall be capable of being lowered with passenger and raised without passenger.

The installed lift shall be free from rattles and other objectionable noises in the stowed position when the bus is operated over rough roads. The design and installation shall minimize metal-to-metal contact points. If necessary the bidder shall such supply additional restraints to ensure this as the Department shall require.

28.1 - Hydraulic system shall meet the following standards as a minimum: pump capacity - 1.7 GPM at 500 PSI, reservoir capacity - 4 quarts, 2 cylinders - 1 1/2" diameter each. Fluid reservoir shall have an easily accessible system for checking and filling.

28.2 - The lift shall be capable of safely lifting a minimum static load of 700 pounds. All power units, operating joints, linkage and mounting points to the body shall be certified by the manufacturer in a written test report as being adequate for this loading. The operation of the unit shall provide a smooth, jerk-free ride in both up and down directions.

28.3 - Lift platform shall be capable of being raised or lowered with a load of 700 pounds in 18 seconds. Manual lowering shall require a maximum of 20 seconds and a minimum of 10 seconds.

28.4 - Power unit shall be provided with a master cutoff switch mounted in vehicle dash.

28.5 - The wheelchair lift operation shall be solenoid controlled and shall contain separate positions for each of the following: fold out, fold in, neutral or hold, power up, power down, gravity down. "Gravity down" shall also be controllable by a manual hand valve in the event of electric power loss. System controls shall be lighted for night operation.

28.6 - A switch shall be provided for control of each function of the lift. For safety purposes, the switch shall be located inside the outer body line adjacent to the lift mechanism or mounted on the inside of one of the lift access doors. If mounted on the inside of the door, unit must be built into the door or permanently mounted in some other fashion.

Any exposed cable for the wheelchair lift controls shall be stainless steel jacket or approved abrasion resistant material of adequate strength to insure that movement and exterior elements will not cause premature failure. Switch location shall preclude access from lift platform itself unless prior approval for an alternate arrangement is provided by the department.

Switch shall be completely weather proof and sealed off from all external elements when not in use and labeled as to function. If control unit is mounted within the outer body line adjacent to the lift mechanisms, a door with lock shall be provided to protect it from tampering.

28.7 - Control switch shall be located in an area that can be reached by the attendant while standing on the ground near the lift. Location of the controls shall be such as to minimize the possibility of the lift being lowered onto the feet of the operating attendant.

28.8 - Lift switch shall be inoperable unless lift access doors are open. The fold-in position shall be inoperable with a load of 50 pounds or more centered on platform.

28.9 - A system shall be provided that will activate an audible alarm when lift access doors are open and vehicle is in any position other than park.

28.10 - Lift platform shall be of cantilever design. Platform shall fold into door area for storing while not in use. Platform in stored position shall not intrude into bus body more than 14".

28.11 - Lift platform shall have provision for holding wheelchair in a secure position while platform is being lowered or raised and shall have a non-skid surface of expanded metal so as not to interfere with driver's vision.

28.12 - All parts of the lift platform intruding into the bus body shall be properly padded to protect the lift occupant from bodily injury. Padding is required at the lift door header to prevent injury to the lift occupant.

28.13 - The full length of the curbside edge of the lift platform shall be equipped with a movable hinged surface to provide a barrier to prevent a wheelchair from rolling off lift during operation. It is recommended that the hinged section shall extend at least 4 1/2" above the platform surface and be spring loaded to provide tension towards the vertical when lift is in cantilevered position off the ground.

28.14 - The roll-off barrier shall be designed to remain in a vertical or near vertical postion (in case of near vertical, hinged section shall angle towards vehicle) in relation to platform when platform is in cantilevered postion but not in contact with the ground surface. When the platform touches the ground, the hinged section shall automatically move from the vertical position to a near horizontal position to provide a smooth transition ramp from ground onto lift.

28.15 - The platform shall be capable of lowering 1.5" below the reference ground line, enabling it to be used in a peculiar condition where ground level might be lower than the area where the vehicle wheels are standing.

28.16 - To prevent injury to appendages which could be under lift platform during operation, the lift shall be equipped with sensitive edges or pressure sensitive valves to remove hydraulic power upon contact with ground surface. Such protection shall be provided as to insure that power will automatically stop when any part of the lift platform touches the ground.

28.17 - Interfacing edges of lift platform and bus floor must be so designed as to prevent injury during lift operation to appendages which might protrude beyond platform and under bus floor.

28.18 - A hand railing shall be provided on the lift platform for use by a wheelchair occupant or an attendant. The railing shall automatically fold down against the platform as the platform folds

up for storage. This device shall provide adequate support to enable a person on the lift to steady himself throughout entire lift operation.

28.19 - All cables, wires, switches and other devices associated with the lift shall be adequately protected from corrosion, abrasion, chafing, and all exterior elements.

28.20 - Hydraulic tubing, cylinders, seals, wires, switches, and other devices associated with the lift shall be of adequate strength and durability to withstand normal but frequent lift use without leaking, breaking or malfunctioning in any way.

28.21 - Testing of the lift will be required to ensure compliance with the specification and reliability of the product. An engineering test shall be performed on one (1) lift of the type installed. This test shall be done at the maximum and minimum temperature and humidity conditions that may be encountered in Illinois operation. The test shall check the operating characteristics and safety features of the lift under repeated cycling at the various temperature and humidity conditions and a maximum and no load conditions. Details of this test shall be submitted for review by the Department.

In addition to the engineering test, each lift shall be quality control tested on the vehicle. These tests shall be performed under load and no load conditions under repeated cycles. Details of the test shall be submitted for the review and concurrence of the Department.

28.22 - Wheelchair lift/step combination type lift mechanism is not acceptable.

28.23 - Bidder shall supply drawings and details of wheelchair lift installation including dimensions, safety features, and controls as part of the Pre-Bid Qualification and Certification Form.

29. General Conditions

29.1 - All tubing fittings shall be Eastman-Imperial, Parker-Hannifin, Bendix-Westinghouse or Mueller Brass, but the same type of fittings must be used in the same location throughout the order of vehicles. Long tubing nuts shall be applied where space condtions permit.

29.2 - All piping, tubing, cables, and wiring shall be properly bracketed.

29.3 - All mounting of assemblies and sub-assemblies including the power plant and accessories shall be mechanically isolated to minimize the transmission of vibration to the body structure.

29.4 - Any pipe fittings subject to high stress shall be of heavy duty type.

29.5 - All exterior light fixtures shall be made of approved materials.

29.6 - Relays, valves, buzzers, chimes, and voltage requlator shall be adequately grounded, but not grounded through the body or box of the unit.

29.7 - All gauges and signal lights on dash, engine compartment, or under body shall be watertight.

29.8 - All rubber seals on ventilator doors and compartment cabinet doors shall be secured in approved shaped channels to firmly hold rubber seals in place.

29.9 - All burrs and sharp edges shall be dressed so as to prevent injury to passengers, operators and maintenance personnel.

29.10 - All castings shall be true and free from imperfections.

29.11 - All clevises shall be removable and not welded to the rods.

29.12 - Drain and filler plugs on rear axle, transmission drain and engine drain plugs shall be of the magnetic type, have hexagon heads, be 3/4", 7/8", and 1/2" pipe thread respectively and be of high strength material.

29.13 - Lumber shall be thoroughly air seasoned or kiln dried; shall be straight grained; and shall be free from rot, knots, checks, and other defects which may impair its strength or durability or mar its appearance. Lumber shall be dressed on all sides to full dimensions. Wood of any type shall not be used except where specified.

29.14 - All welding shall conform with American Welding Society standard quality procedures and where visible have a finished appearance.

29.15 - All flexible hoses used in the engine compartment for air, oil, and water shall be teflon hose with braided stainless steel jacket and standard SAE brass or steel fittings.

29.16 - All insulations, plastics, and synthetic material shall be fire-retardant, self-extinguishing and non-toxic.

29.17 - All surfaces to which springs are attached shall be of such a pattern as to prevent excessive grooving or wear of the parts.

29.18 - All jack shafts or spindle brackets which require removal for maintenance shall be bolted-on rather than welded-to the vehicle-frame structure.

29.19 - The accelerator control systems shall meet the requirements of FMVSS 124.

29.20 - All grease and oil fittings shall be readily accessible for lubrication.

29.21 - All steel bolts, nuts, screws, and washers shall be cadmium plated, except where otherwise requested. The thickness and method of cadmium coating shall conform to ASTM Sepcification no. A-165, latest revision, for type TS coating. All cap screws, nuts and bolts shall be of SAE, Grade 5 material, unless the application requires a higher grade material. The "Grade Specification" for bolts and cap screws used on accessories shall be waived, providing the bolts and cap screws meet with the accepted standard successfully used, on such accessories, in the transportation industry. Bolt projections through nuts shall not be excessive. Should there be a reason for excessive bolt projection, the bolts shall be double nutted. Bolts used with nylon insert lock nuts shall be sized to extend at least two full threads through the locking ring but shall not extend more than two threads beyond the length of the next longer bolt.

29.22 - All sheet metal screws shall comply with ASTM and ASA recommendations relative to quality and installation. Phillips head sheet metal screws shall be avoided where possible.

29.23 - Bosses on units of light construction, with threaded sections in which fittings or pipes are connected, shall have hexagon or square shoulders which can be held with a wrench so as to eliminate damage to the unit.

29.24 - All non-painted aluminum shall be anodized.

29.25 - Specific manufacturer's recommendations as to the adjustment and settings shall be provided to the Department prior to bus delivery. Items such as voltage regulator, governors,

engine tune-up data, and pertinent data shall be furnished to allow time to prepare service and inspection forms for initial bus inspection.

29.26 - All air, oil, and water lines and openings into equipment units shall be sealed, plugged or adequately protected against entrance of contaminants until connected.

29.27 - Mounting of major assemblies including engine, transmission, axles, power steering and suspension components shall be such that dismounting shall be easily carried out by conventional shop methods.

29.28 - All question regarding the quality of safety glazing material shall be settled by the test methods prescribed in the American Standards Association's latest revision of AS-Z-26-1A, "Safety Code for Safety Glass for Glazing Motor Vehicles Operating on Land Highways".

29.29 - The edges of all glazing material shall be finished to a minimum SAE #4 edging to prevent cutting into rubber channels.

APPENDIX C

QUESTIONS AND ANSWERS ON IMPLEMENTING DISADVANTAGED BUSINESS ENTERPRISE PROVISIONS OF THE SURFACE TRANSPORTATION ACT SECTION 105(f)

1 NOVEMBER 1983

QUESTIONS AND ANSWERS ON IMPLEMENTING
DISADVANTAGED BUSINESS ENTERPRISE PROVISIONS
OF THE SURFACE TRANSPORTATION ACT SECTION 105(f)

1. Q. Are transit vehicle manufacturers required to submit a goal for the utilization of female-owned firms? Only a DBE goal is required by Subpart D; no mention is made of a goal for female firms in the existing MBE regulation.

   A. Section 23.67 specifically implements the requirement of Section 105(f) of the STA and Section 19 of the UMT Act. MTVs will be responsible for WBE goals under the basic regulation which used the term MBE as inclusive of WBEs. Therefore, UMTA will expect to see the MTVs goal for WBEs as well as DBEs included in its submission. Recipients no longer set goals for either DBEs or WBEs involving funds covered by Section 23.67.

2. Q. Section 23.64(d) and (e) refer to Section 23.45(g) of the existing regulation, which in turn requires anyone establishing a goal to publish it for 45 days in a local paper. What papers will an MTV be required to publish in? Where is the plant located - Federal Register, etc?

   A. Each MTV will be permitted maximum flexibility in structuring its goal-setting process. UMTA will not mandate any specific publication methods, although as a remedial measure or as a condition of approval of a goal of less than 10 percent, specific methods to increase information dissemination may be suggested. It is anticipated that MTVs would publish in major supplier journals and newspapers, actively seeking out ways to communicate with DBEs and WBEs.

3. Q. If all bids are rejected on a solicitation which began prior to October 1, 1983, and the contract is resolicited after October 1, 1983, do the new requirements apply to the resolicitation?

   A. Yes

4. Q. Is the passage of any time period required before an MTV may state that UMTA has not disapproved its goal?

   A. No. Once an MTV submits its proposed goal to UMTA, it may certify compliance with Section 23.67. Once a goal is submitted, the burden is on UMTA to act if disapproval is in order. The MTV can continue to make this certification until UMTA informs it to the contrary.

5. Q. What of bad faith situations; i.e., on the same day that a bid is submitted; the MTV submits an unacceptable goal to UMTA but technically is able to certify that its goal has not been disapproved?

   A. Once the MTV has submitted its goals to UMTA, it can certify compliance. Where bad faith can be shown, action to prohibit future participation might be an appropriate remedy. Each case will be examined on its facts. In no case, absent collusion, would an UMTA grantee be penalized for bad faith of the MTV.

6. Q. Does the MTV goal apply to all manufacturers regardless of company size or type of vehicle manufactured (e.g., small vans)?

   A. Yes, with the exceptions stated below. Section 23.67 only applies to vehicles used by UMTA recipients for the primary program purpose of public transportation (e.g., buses, railcars, vans). Therefore, we are excluding procurements of other vehicles which are used for support services (e.g., cars used by field supervisors, trucks, tow trucks, yard locomotives and similar vehicles used for maintenance and operations rather than transport of program beneficiaries). UMTA funds and the contract opportunities associated with the procurement of support vehicles are included by recipients in determining the threshold levels in Section 23.41 and for the base calculations used for setting goals under Section 23.45(g).

7. Q. What requirement exist where a distributor rather than a manufacturer bids on the project?

   A. The intent of the Section is to ensure that vehicles purchased with UMTA assistance include appropriate participation by DBEs and WBEs in the contracting opportunities created by those purchases. Not requiring a certification by a distributor, as would be required of the manufacturer offering the same vehicle, could lead to manipulation of both the DBE regulation and grantee procurement processes.

   Therefore, a distributor or dealer is responsible to provide certification of manufacturer compliance for those vehicles it seeks to offer. Submission of the required certifications is to be made a condition of bidding or proposing the same as it is for a manufacturer wishing to bid the product directly.

   A distributor should be able to obtain the information without difficulty from the manufacturer. Language used by recipients in their solicitation packages must differentiate between a manufacturer, which certifies its own compliance, and a distributor or dealer, which certifies that the manufacturer of the vehicles being offered has complied.

8. Q. How will compliance be enforced against an MTV? I realize the burden will be on the grantee to get certification from the MTV, but what is the penalty if an MTV falsifies a certificate? Are we going to penalize the grantee?

   A. UMTA reserves the right to withdraw its approval of an MTV's goal at any time for just cause. Criteria for monitoring and enforcing goal commitments by manufacturers similar to those applied to grantees under Section 27.68(c) and (d) will be utilized. Additionally, UMTA would expect recipients to enforce whatever contract remedies they might have against a contractor who knowingly falsifies information material to the award of a contract. Grantees will not be penalized for misrepresentations by MTVs or offerors of the MTVs product absent gross negligence on the grantee's part.

9. Q. How can MTVs estimate the amount of UMTA funds to be received during the year prospectively; in other words, prior to bid opening or award?

   A. Section 23.67 calls for use of estimating techniques much the same as

recipients are requested to estimate anticipated DOT-assisted contract awards.

Any reasonable method based on past experience of actual sales, which includes allocation of the Federal share to the average sale price of a unit (bus), is acceptable; e.g.,

Annual Production and Sales Average 50 Units

Average Sales with DOT Aid 100 Units

Base = 80% x Sales Price x 100

10. Q. What happens if an MTV fails to achieve the goal that is has certified to UMTA?

A. UMTA will follow a process analogous to that used for recipients under Section 23.68. That is, we will ask the manufacturer for an explanation of the shortfall. Absent a satisfactory explanation, UMTA may instruct the MTV to take remedial steps. If the remedial steps are not taken, UMTA would have just cause to withdraw its approval of the MTV's goal.

11. Q. Is UMTA to assume that transit vehicle manufacturers are going to pass on their DBE goals to their suppliers?

A. Yes. To the extent that there are contracting opportunities in the manufacturing of transit vehicles, DBE goals will have to be met either by direct contracting with available DBEs by the MTVs or through use of DBE subcontractors by suppliers or component manufacturers for the MTV.

It should be emphasized that the DBE/WBE participation of suppliers and component manufacturers does count toward the MTVs' goals. The MTV verifies the subcontractor participation by a means of its choice. This verification is subject to review and verification by UMTA.

12. Q. Transit vehicle manufacturers must submit certifications to the grantee certifying they have complied with Section 105(f). Must the grantee forward these certifications to UMTA (the Regional Office) or does UMTA assume that the grantee has the requisite certification when procuring vehicles?

A. The certifications are a condition of bid and, thus, treated no differently than other elements of the solicitation package included by the recipient as a condition of receipt of the grant from UMTA. Any compliance review of recipient procurement systems would include a check for this documentation.

13. Q. Do MTVs have to follow the DBE/WBE eligibility certification requirements of 49 CFR Part 23?

A. Only eligible DBE or WBE firms can be counted toward recipients' or MTVs' goals. If they are to count toward the goals, the DBE or WBE firms must be certified as eligible by someone. The MTV may rely on eligibility

certifications made by an UMTA recipient, the Small Business Administration under the 8(a) program, or another MTV. Alternatively, the MTV itself may do the certification consistent with the standards of 49 CFR 23.53. MTVs also could get together among themselves or with suppliers and component manufacturers and do certifications as a consortium.

14. Q. If a transit vehicle manufacturer's WBE goal is less than 10 percent, must a justification be submitted in accordance with Section 23.65 as is required for a DBE goal of less than 10 percent.

A. No. The 10 percent requirement of Section 105(f) does not apply to WBE goals, Therefore, although the same methodology should be used to establish WBE goals as is used for DBE goals, there is no parallel requirement that Section 23.65 be followed in cases where WBE goals are established below the 10 percent level.

15. Q. Since some manufacturers of transit vehicles may not have been aware that WBE goals were also required, can any relief be given to the requirement that the WBE goal must be submitted as a condition of bid?

A. Yes. UMTA will consider granting an extension to manufacturers for submission of WBE goals on a case-by-case basis, as requested. During such an extension, MTVs that have submitted DBE goals that have not been disapproved will be eligible to bid.

16. Q. What effect does the October 1, 1983 regulation have on solicitations let for bid or proposal before that date where bids or proposals are not actually received by bidders or offerors until after the effective date, say October 15, 1983?

A. None. UMTA's prior "best effort" policy and any specific goals required by the recipient would govern. Section 23.67 controls only bids or requests for proposals issued on or after October 1, 1983.

17. Q. Is the MTV's base for calculation of goals the percentage of Federal funds involved in the contract price of the vehicle(s) as offered to the grantee or is it computed on the contracting opportunities which the MTV has to make available to DBEs and WBEs (like a recipient does in calculating goals under 23.45(g))?

A. The MTV is required to follow Section 23.45(g) (normally applicable to recipients) in setting its goals. While Section 23.67 states that the base for the goal is "the amount of the UMTA financial assistance participating in transit vehicle contracts", that is to be read as the amount of financial assistance participating in contracting opportunities arising out of transit vehicle contracts.
This choice relating to determination of the base should have no effect on the dollar value of work going to DBEs or WBEs. It must be remembered that the reasonableness of the percentage goals is based upon availability of DBEs and WBEs to provide the materials, goods and services required by the MTV in its manufacturing and distribution process. Thus, the dollar value of work going to DBEs and WBEs would remain constant using either base for calculation. Any submission of goals by an MTV to UMTA must include a description of the methodology used to set the goals, the types and kinds of

contracting opportunities the MTV has to offer and the known availability of DBEs and WBEs to perform those contracts.

18. Q. Van conversions frequently involve at least a two-step manufacturing process whereby the second-stage manufacturer buys a van from a car dealer or first-stage manufacturer and then modifies it for the contract. Similarly, the second-stage manufacturer may just buy the chassis from the first-stage manufacturer and add the body. Do these second-stage manufacturers have to comply with the requirement of Section 23.67 and, if so, how?

A. Yes. The final-stage manufacturer is the MTV for purposes of the regulation. As an MTV, the firm would include in its proposed goal the DBE and WBE content of its subcontractors and component suppliers/manufacturers of which the first-stage manufacturers referred to above might be only one of many.

A different situation arises where the vehicles to be converted already belong to the recipient. Contracting opportunities for conversion of such vehicles are included in the base of the grantee and are outside Section 23.67.

19. Q. Are bus rehabilitation firms MTVs?

A. No. Bus rehabilitation involves used vehicles rather than newly manufactured vehicles. Only the latter are included under Section 23.67.

20. Q. If, in a particular locality, no MTV or distributor can be found which can make the necessary certifications required by Section 23.67 where small buses, e.g., less than 25-feet in length, or vans are being sought, would UMTA permit the recipient to include the funds in its base and set contract specific goals for the particular procurement as a necessary means to accomplish the procurement?

A. UMTA would not foreclose the possibility should such a situation occur. Any such request to UMTA, however, would have to include the names and addresses of businesses in the locality which were solicited prior to making the determination of nonavailability. Any necessary adjustments to the recipient's base and overall goals caused by this circumstance would be submitted at the same time for UMTA review and approval.

21. Q. Do UMTA recipients still have the option of setting DBE and WBE goals for transit vehicle procurements in addition to any goals approved by UMTA under Section 23.67?

A. Where non-DOT-assisted contracts are involved, the policy option which permitted recipients to set contract goals for DOT-assisted transit vehicle procurements prior to the October 1, 1983, effective date of Section 23.67 is no longer available. Those funds have been specifically excluded by Section 23.41 from the recipients' program calculations. However, under the earlier policy, a recipient could elect to include those funds in its calculations and set specific contract goals.

This limitation does not include support vehicles, e.g., supervisory cars an maintenance vehicles which are in the recipient's program and exlcuded from Section 23.67.

Also, exceptions may be granted by UMTA on a case-by-case basis for procurements involving small buses of less than 25-feet in length and vans where a determination of nonavailability can be supported following attempts at solicitation through UMTA certified MTVs and their distributors.

APPENDIX D

SURVEY OF PARTICIPANTS

James R. Dumke
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APPENDIX D
SURVEY OF PARTICIPANTS

James R. Dumke
Transportation Systems Center

Subsequent to the workshop participants were asked to evaluate the Indianapolis program to provide UMTA with insight into possible needs for further technical assistance in the small vehicle field. Responses to the questionnaire were received from 41 participants. Most respondents provided thoughtful answers to the open-ended questions which dealt in part with State and local roles and were too complex to resolve during the workshop itself.

Questions and a summary of responses are presented below.

What is your evaluation of the following segments of the Agenda:

	ESSENTIAL	HELPFUL	NOT NECESSARY
Progress reports on ongoing studies/developments:	15	24	1
Interpretations of UMTA regulations:	34	7	0
Reviews of State-developed specifications:	15	24	1
Discussions of procurement and technical assistance practices:	23	18	0
General Discussions:	18	17	3

Was the mix of participants appropriate? Any recommended improvements?:

The responses to this question were mostly favorable. Some ideas for improvement included having more providers in attendance: space and time for product demonstrations; and more time on supplier problems. There appears to be a continuing need for extensive technical communication between buyers and users.

We have received the following suggestions for future workshops; to repeat this one in another location; to provide a similar workshop on maintenance; or to have a workshop focusing on chassis for small transit vehicles, with representatives from the users of these vehicles present as well. Please comment on these alternatives or suggest any topics you feel would be appropriate for a future Small Transit Vehicle Workshop:

The majority felt that an update of the same workshop would be most useful and could be held in another location to bring in States that were unable to attend. Other comments included:

- o Similar workshop on maintenance (or add maintenance to this one)
- o Workshop on financial aspects of procurement
- o Technical seminar on vehicle engineering/specifications
- o Detailed workshops on Air Conditioning, Chassis and Electrical
- o UMTA use and disposition guidelines/refurbishing issues
- o Risk Management (Insurance and Driver Training)
- o Computers and software for managing small operations
- o Meeting with buyers, vehicle manufacturers and chassis manufacturers

Although the variety of answers to this question precludes tabulation, there was an underlying sense that the next workshop could be more technical and could have more specifics about how to:

- o Run a State or Regional Workshop
- o Inspect vehicles
- o Write and coordinate the procurement specification

Do you think the Regional workshops run by State DOTs would be an effective way to provide technical assistance to transportation providers. If so, would national workshops for the State DOTs be helpful in developing and preparing for the State workshops? Please comment.

A large majority answered affirmatively to both questions posed. Comments by those respondents who disagreed included, "Small states are at a disadvantage," and "...should be done on UMTA regional level."

APPENDIX E

LIST OF PARTICIPANTS

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